HORNBILL

DISCOVER THE LIVING WORLD

OCTOBER-DECEMBER, 2018

BNHS India CONSERVING NATURE SINCE 1883

BOMBAY NATURAL HISTORY SOCIETY

Fantastic views. Wherever, whenever.

Special offer on ZEISS Terra ED Binoculars

TERRA ED
ZEISS

FERNGLAS-KOMFORT-TRAGEGURT
BINO HARNESS
ZEISS
OGIO
GIFTS
worth
₹10,240/-*
OGIO Bag &
ZEISS Binocular
Harness

/ TERRA
ZEISS. PIONEER SINCE 1846.

The all-new Terra ED Binoculars by ZEISS now comes with a limited period offer. Get a ZEISS Binocular Harness and an OGIO bag worth Rs.10,240/- absolutely FREE. The perfect companion to see wildlife like never before.

Now Available in Black, Black-Grey and Black-Green

*Offer only on Terra ED 8 x 42 & 10 x 42. Offer valid till 14th February, 2019

Authorised Distributors:
West: Ajanta Photo & Technologies Pvt. Ltd., Nagpur, Tel.: 9370199470; United Peripherals, Pune Tel.: 9823098150; COLO Venture, Mumbai Tel.: 9819429996; Laxmi Enterprises, Gujarat Tel.: 98250 50916; **South:** Srishti Digilife Pvt. Ltd., Hyderabad Tel.: 9399973935; Fotocircle, Bangalore, Tel.: 9845022654; Lensowl Creative Ventures Pvt. Ltd., Bangalore, Tel.: 9900016088; Fourtek Systems, Kerala, Tel.: 9544455448; Vivek Infocom, Chennai, Tel.: 9600120881; **North:** Avit Digital Pvt. Ltd., New Delhi Tel.: 9811017774; **East:** Srishti Digilife, Kolkata, Tel.: 8231022224

BAJAJ FINSERV | EMI NETWORK | THE WAY TO PAY

Follow us:

Carl Zeiss India (Bangalore) Pvt. Ltd.,
Plot No.3, Bommasandra Industrial Area, Bangalore-560 099, India.
Customer Support: consumeroptics.india@zeiss.com • Tel: 011-45156000
www.zeiss.com/sports-optics
CIN: U33125KA2009PTC049465

*Finance at the sole discretion of financier. Limited period offer. T&C apply.

ZEISS

HORNBILL
October-December, 2018

BNHS India
CONSERVING NATURE SINCE 1883

GOVERNING COUNCIL

President
Mr Homi R. Khusrokhan

Vice Presidents
Ms Usha Thorat
Mr Praveensingh Pardeshi (IAS)
Lt Gen. V.K. Ahluwalia (Retd)

Honorary Secretary
Mr Debi Goenka

Honorary Treasurer
Mr E.A. Kshirsagar

Director
Dr Deepak Apte

Members
Ms Sumaira Abdulali
Dr Erach Bharucha
Dr Bharat Bhushan
Dr Ravi Chellam
Ms Tara Gandhi
Mr Arun Kumar Gupta
Mr Isaac Kehimkar
Dr Ashok Kothari
Mr Kulojyoti Lahkar
Mr Satish Pradhan
Dr Asad R. Rahmani

The Joint Secretary, Ministry of Environment, Forest & Climate Change Govt of India
The Addnl IG Forests (WL) Ministry of Environment, Forest & Climate Change, Govt of India
The Director of Archaeology & Museums, Govt of Maharashtra

Editors
Deepak Apte
Vibhuti Dedhia
Ranjit Manakadan

Consultant Editors
Gayatri W. Ugra
Isaac Kehimkar

Editorial Assistant
Sonali V. Vadhavkar

Layout
V. Gopi Naidu
Sanchita S. Kadge

Cover: Crimson-backed Sunbird
Raghav Gupta (IRS)

Published and printed quarterly
by Mr Debi Goenka for the
Bombay Natural History Society,
Printed at Akshata Arts Pvt. Ltd.,
Lower Parel, Mumbai.
Reg. No. RN 35749/79, ISSN 0441-2370.

For more information on the Society
and its activities,
write to the Honorary Secretary,
Bombay Natural History Society,
Dr Sálim Ali Chowk, S.B. Singh Road,
Mumbai 400 001, Maharashtra, India.
Tel.: (91-22) 2282 1811
Fax: (91-22) 2283 7615
E-mail: info@bnhs.org
Website: www.bnhs.org

Views expressed by the contributors in the *Hornbill* are not necessarily those of the BNHS. Unsolicited articles and photographs, and materials lost or damaged are not our responsibility and no claims will be entertained.

CONTENTS

FEATURES

Enchanting Sigur Range

Passion for wildlife takes a trekker on innumerable long walks through forests, in valleys and over mountains, but some journeys are special; Sigur Range is one such place for **A.J.T. Johnsingh**. Read on to soak in his passion for wildlife and Sigur.

Extinction, courtesy *Homo sapiens*

Planet earth has witnessed five mass extinction events since the first life forms appeared, but none are like the sixth species-extinction event that is currently in process. **Ranjit Manakadan** and **Asif Khan** discuss the human-induced extinctions on our planet.

The Borgad Conservation Story

Nature Conservation Society of Nashik was instrumental in restoring the lost glory of Borgad hills, situated near Nashik. **Pratiksha Kothule** shares the work of her mentor Bishwarup Raha, her team, and the local communities that fructified this effort.

Others

Readers' Space 22
Book Reviews 26
Nature Watch 30
Conservation Notes 34
Remembrance 40
News Briefs 44

© Bombay Natural History Society 2018

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without permission in writing from the Bombay Natural History Society (BNHS). Enquiries concerning reproduction outside the scope of the above should be addressed to the Honorary Secretary, BNHS, at the address given.

Meeting conservation challenges in a rapidly changing world

The last few months of 2018 have been full of mixed emotions as we lost quite a few stalwarts: Dr B.F. Chhapgar, Shri Digveerendrasinh Solanki, former Maharaja of Vansda, Vice Admiral Manohar P. Awati, and some very close friends and associates, Harry Andrews, Bishwarup Raha, and Jaimesh Thapar. All were strong supporters of BNHS for a very long period of time.

On one hand, we are yet to come to terms with the loss of so many friends, nature lovers, and well-wishers, while on the other, wildlife has witnessed a low on several fronts. From the Avani episode to the deaths of several lions due to disease, to the decimation of wildlife on roads, fences, canals, transmission lines, and fishing nets, wildlife in India is witnessing a grave situation. As if this was not enough, natural calamities too have taken a toll on wildlife. Seven cyclones hit the east coast this year, of which Gaja, in particular, hit Point Calimere hard, causing severe casualties among birds – nothing seems to be going right for wildlife at this point of time.

Imprudent actions have resulted in diversion of forest land and loss of key forests in wildlife corridors, ultimately bringing human-wildlife conflict to our doorstep. The new 'Green Field' alignments of national highways and expansion of state highways crisscrossing through and around protected areas will only worsen the situation: isolation of wildlife and its decimation on roads is now certain. While Wildlife Institute of India (WII) has recommended mitigation guidelines for linear infrastructure, our dismal record of implementation of safeguards provides little confidence as to their effectiveness. The flipside of this policy is that now every concerned government agency believes that, with these guidelines, roads, highways and railways can be built wherever one desires. It is, therefore, not surprising to see a surge in the number of proposed linear projects through critical wildlife areas, such as Bandipur, Ranthambhore, Tadoba, and Melghat, to name just a few.

The choking air of Delhi, the ever increasing summer heat and erratic rains, recurring droughts and failing agriculture, are signals that Climate Change is no longer a myth; it has already entered our homes. And unless we become 'climate smart', we will be at its mercy. Our generation believes that the solution to this impending peril rests in the emerging technologies, forgetting that there is no better technology than nature, which witnessed far more violent forces during the course of evolution and continued to flourish. Nature-based solutions will thus be far more relevant in today's time than engineering solutions alone. Thus, a blend of engineering and the secrets of nature is the best way forward. A recent example is the blend of hard structure and sand impregnation used to restore the beach of Puducherry.

Among all this multitude of depressing news, a refreshing piece of news was in-principle approval by the Maharashtra State Board for Wildlife (MSSBWL) on 5th December, for the declaration of about 200 sq. km in Kanhargaon in Chandrapur district as a wildlife sanctuary. The decision was taken at the 14th board meeting chaired by the Chief Minister. The Board also decided to expand the Umred-Karhandla Wildlife Sanctuary and Bor Tiger Reserve by relocating three villages each from these PAs. As a member of the Board, BNHS strongly supported these moves.

Coming to more BNHS-specific news, our half-yearly newsletter *ecoScapes* is receiving excellent response. We hope to connect with members through the newsletter on the work we do, and on how our members can contribute to the Society. We appeal to our members to help in the recruitment of more members.

Our recent title INDIAN BIRD MIGRATION ATLAS has received excellent response. We have about 100 copies left of the first edition and we urge those who are desirous of having a copy to get one without delay, before the stock is sold out. The Marathi translation of THE BOOK OF INDIAN BIRDS was released last month and is receiving excellent response; we hope that Dr Sálim Ali's classic reaches a large number of Marathi readers. The Gujarati translation is in the offing, and you will see it in the bookshops soon.

Our initiative for digitization of specimens in the BNHS Collections has received a major boost with the support of CIDCO and MMRDA, and full-fledged digitization work is under way. In the last two months, we have digitized about 300 specimens and we aim to complete digitization of the entire Collections within the next eight to ten years.

Another achievement, thanks to our long-term major research and conservation projects, is that our CRISIL rating has been elevated to 1A from 1B for the NGO sector.

In my recent appeal to members, we requested members to 'adopt' any of the 20 species that we are working on to develop species conservation action plans. We aim to release these action plans during the upcoming CMS COP-2020 in India. Our appeal resulted in three donations of Rs Two lakhs each to develop action plans for Lesser Flamingo, Greater Flamingo, and Crab Plover. We still need and solicit support for Black-tailed Godwit, Little Stint, Eurasian Curlew, Indian Skimmer, Yellow-breasted Bunting, White-headed Duck, Long-toed Stint, Ferruginous Duck, Black-bellied Tern, Sociable Lapwing, European Roller, Red Knot, Common Pochard, Lesser Sand Plover, Curlew Sandpiper, Great Knot, and Bar-tailed Godwit.

And last but not least, we are delighted to announce that we will be holding an international conference in the coming year on 'Wetlands, Migratory Waterbirds, and Flyways of Asia', that will be held in Lonavla, Maharashtra, from 18th to 22nd November, 2019. The conference website will be launched by 15th January, 2019, and participants can register online. It will be an eventful five days, with deliberations on wetlands and migratory birds of the Asian flyways, and on meeting conservation challenges in a rapidly changing world. Unfortunately, the capacity of the conference is limited to 300 individuals, and so we recommend early registration as soon as we go online, to avoid disappointment.

Deepak Apte

Enchanting Sigur Range

Text and Photographs: **A.J.T. Johnsingh**

Argyreia cuneata, very common in Mudumalai landscape after the rains

The matriarch of a small group of elephants standing behind a live fence of exotic Agave *Furcraea foetida* watched us intently as we sat safely in a jeep 15 m away. There was no sign of aggression in her look, although our intrusion had made her stop feeding on the tender green leaves of a thorny *Acacia pennata* bush. Soon after this, we saw a Black-naped Hare ravenously and

The matriarch of the small group watched us intently, 3rd October, 2017

As I stood and waited behind a tree, the tiger spotted my colleague, froze, turned around and ran away, 14th March, 2016

yet fastidiously feeding on grass hardly 5 m from the road, unruffled by our approaching vehicle. We observed it for several minutes, amazed by its appetite and grooming activities, and then moved along. It was the evening of 3rd October, 2017, and we were on the jungle road to Anaikal Mariamman temple from Anaikatti forest rest house in Sigur Range in Nilgiris North Division. The road goes along the right bank of Kedarhalla, a stream which has a copious amount of water during a good monsoon.

The fascinating Sigur Range with its scenic landscape is one of the richest places for wildlife in the country, and forms part of the landscape bridge between the Western and the Eastern Ghats. This 180 sq. km range is bounded by Masinagudi Range (Mudumalai Tiger Reserve) to the west, Bandipur Tiger Reserve to the north, Bhavanisagar Range of Sathyamangalam Tiger Reserve and the Nilgiri Eastern Slopes Range of Nilgiris North Division to the east, and Singara, Udhagai North and Kattabettu ranges of Nilgiris North Division on the southern border.

The general vegetation profile of Sigur Range, which is in the rain shadow area of the biodiversity-rich Western Ghats, can be classified as thorn-scrub. Some of the thorn-bearing species are *Acacia pennata*, *Atalantia monophylla*, *Catunaregam spinosa*, *Carissa carandas*, *Dichrostachys cinerea*, *Euphorbia trigonum*, *E. tortilis*, *Gmelina asiatica*, *Lantana camara*, *Opuntia dillenii*, *Todalia asiatica*, *Ziziphus mauritiana*, and *Z. xylopyrus*. Examples of non-thorn species are *Albizia amara*, *Anogeissus latifolia*, *Cassine glauca*, *Cassia fistula*, *Chloroxylon swietenia*, *Commiphora caudata*, *Dalbergia paniculata*, *Dodonaea angustifolia*, *Erythroxylon monogynum*, *Grewia orbiculata*, *Sapindus trifoliatus*, *Premna tomentosa*, *Rhus mysorensis*, and *Strychnos potatorum*.

In this dry landscape, some magnificent examples of trees such as *Hardwickia binata*, *Givotia rotleriformis* and *Gyrocarpus americanus* can also be seen. Along the four streams (Sigur, Kedarhalla, Avarahalla, and Gundatihalla) and the Moyar River (all arise from the Nilgiris, which translates to Blue Mountains), riverine vegetation with species such as *Diospyros malabarica*, *Madhuca longifolia*, *Mangifera indica*, *Mitragyna parvifolia*, *Pongamia pinnata* [now *Milletia pinnata*], *Syzygium cumini*, *Terminalia arjuna*, and *T. bellirica* are also seen. Some among these look ancient and quite majestic in appearance.

My association with the Sigur Range goes back to the early part of 1973 when, as a totally untrained wildlife biologist, I started my studies on the Dhole, which culminated in my two-year PhD field work in Bandipur Tiger Reserve in 1978. My

A brown Blackbuck male near the Moyar River

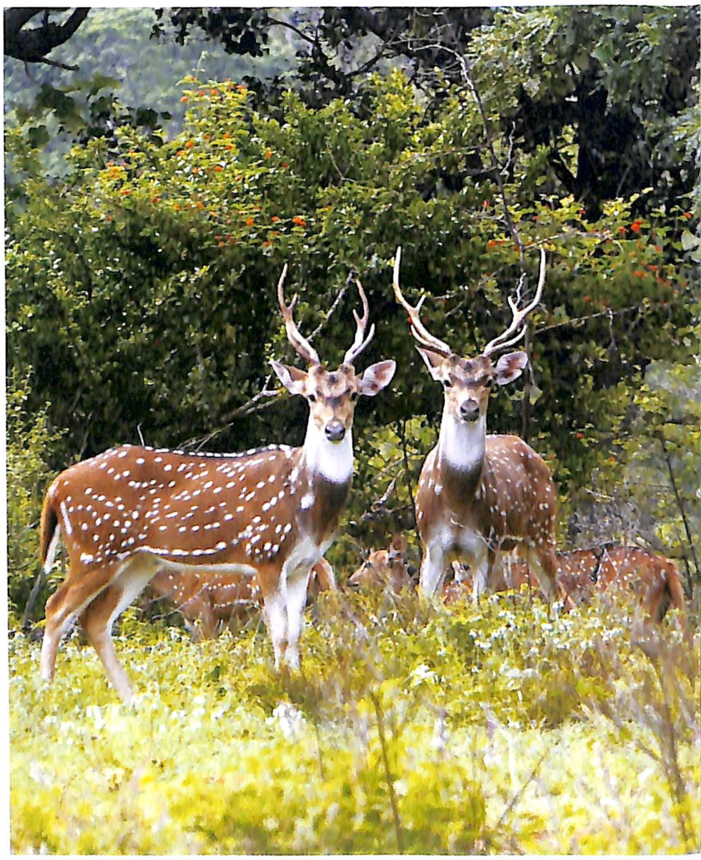
Hardwickia binata, a characteristic tree species of Eastern Ghats

companion and mentor in Sigur Range was Dr Michael Fox, a canid behaviourist, then teaching in St Louis University, USA. Our base in Sigur Range was Cheetal Walk, the weekend jungle home of the late E.R.C. Davidar, situated on the bank of Sigur stream. He was working with the United Planters Association, Nilgiris. A lawyer by profession, he was a dedicated conservationist in thought and action.

In 1973 and 1975, I stayed in Cheetal Walk for five months in all, and in those days Sigur stream had copious amounts of water, with many pools supporting an abundance of small fishes which were hunted by Smooth-coated Otters. During those five months, when I learnt to walk alone in elephant habitat, I never sighted tigers nor saw signs of them. Davidar attributed this to large scale poisoning by cattle owners who had many camps in the jungle. Even now, the sites of the cattle camps can be identified by the abundance of exotic and inedible *Parthenium hysterophorus*, which grows profusely in the manure-rich land soon after the rains.

According to Davidar, the cattle owners resorted to poisoning soon after tiger hunting was stopped in 1966, as there was no one to shoot the tigers that were cattle lifters. Poisoning possibly also had a disastrous impact on other carnivores and scavengers – one day I came across about 20 dead vultures along a stream bed. Fortunately, the Tamil Nadu Forest Department quickly sprang into action and removed the cattle camps, and thereafter,

Amidst the abundant weeds, a herd of Cheetal



the area got rapidly repopulated by tigers dispersing from the Mudumalai and Bandipur wildlife sanctuaries. In 2010, when WWF-India undertook camera trapping in Sigur Range, they recorded over 20 individual adult tigers. Fortunately, the bulk of the range is free of villages, enabling the tiger recovery. The only two interior villages are Anaikatti and Siriur, and there are others (Chokkanalli, Vazhaithottam, Chadapatti, Mavanahalla, and Chemmanatham) that are largely situated in the west, close to the Masinagudi-Ooty road.

Interestingly, cattle abundance in the past, comprising largely low-milk-yielding scrub cattle, resulted in the higher availability of dead cattle, benefiting the Striped Hyena (its tracks were much more common in the past than they are now). Early one morning, I had my first sighting of a hyena in Jayadev Avenue in the Masinagudi Range. With its stripes, in the dim light of the dawn, it looked like a young tiger. Another time, we came across hyena tracks below a tree where a leopard had taken up the carcass of a cattle calf. Once, a dead hyena which had died of poisoning was seen, and while doing the post-mortem, we were amazed to see its powerful jaw muscles that help to crack heavy bones. Hyenas feed a lot on bones and as a result their droppings are white like chalk. An exciting finding was a hyena den that we had presumed was being used by dholes. Its entrance in a *nallah* bank was so large that Dr Fox and I could crawl in with a shield (for protection from a likely attack of a porcupine, which also uses such dens). The interior of the den was so large that ten people could crouch and sit inside comfortably. The den had lots of bones, skins of Sambar, and an abundance of fleas, which crawled all over us. As dholes do not carry prey to their dens, we concluded that the den belonged to the hyenas.

I renewed my contact with Sigur Range after I retired from Wildlife Institute of India in October 2005, and on starting a project on the Western Ghats in 2007. My work was carried out through Nature Conservation Foundation (NCF) with funding support from the Ministry of Environment and Forests, Government of India, and Save the Tiger Fund. With my colleague Raghu (from NCF), I roamed all over Sigur Range, which enhanced my understanding of this enchanting habitat. During our visits, we stayed at the Anaikatti Forest Rest House that was built in 1910, at an altitude of 900 m. On a wall in the drawing room of the rest house, there was a skull with horns of a young male Gaur killed by a tiger in 1938.

Our stay in the rest house was always fabulous. A long line of blue mountains, about 4 km south of the rest house, rise to a height of nearly 1,829 m, where cotton-white clouds often gather in the valleys. The view of the mountain from the rest house, however, was blocked by a row of four *Delonix regia* trees. Sitting in the sunlit verandah, we often watched Three-

Blue Pansy, Sigur Range, 3rd October, 2017

Black-naped Hare, and *Opuntia dillenii,* a highly problematic species in the background

Curious Jungle Bush-Quails, Sigur Range, 2nd October, 2017

The Butter that Flies

Butterflies have fascinated us for so long that we created our own butterfly garden at Trombay/Visakhapatnam/Balasore. Isaac Kehimkar and Sqn Ldr Girish Dantale are our inspirations in this field.

During a Mumbai posting in 2009–11, we decided to take a closer look at the life cycle of butterflies. Isaac Kehimkar's THE BOOK OF INDIAN BUTTERFLIES was of paramount help. We began our quest by gathering information on the food plants of butterflies. Then we began looking for these food plants in our garden, and next we searched for caterpillars. Our first sighting was of a Lime Butterfly that was laying eggs; the 2 mm spherical egg was white to yellowish, and placed underneath a fresh leaf of a lemon plant. For the next few days, we monitored the egg and then witnessed the growth of the caterpillar, eagerly waiting for it to pupate so that we could see the butterfly emerge. But around the eighth day, when we checked the caterpillar, we were shocked to see that it had become a meal for a myna. One should not interfere with the laws of nature, but despite knowing and understanding this, we did not wish to take a chance with the remaining eggs!

The very next day, we bought some lemon plants from a nursery and transferred the caterpillars onto them. Our life began revolving around the caterpillars, and soon they became an integral part of our family. All our conversations throughout the day were about the activities of the caterpillars. Since we knew nothing about a butterfly's life cycle, we read books to understand metamorphosis so that we could rear the caterpillars successfully.

Encouraged by our experience, we decided to rear some more species at home. Rearing Blue Tiger was a challenge due to its food plant, which was a wild creeper *Dregea volubilis*. We brought fresh leaves daily and pinned them onto the thorns of the lime tree. The caterpillar metamorphosed into a lovely adult in a few weeks. Since then, we have reared Lime Butterfly, Blue Tiger, Common Mormon, and Glassy Tiger, among others.

My next posting was Visakhapatnam, and thereafter other cities of India. Our journey began at Ovalekar Wadi with Isaac Kehimkar; the passion that he kindled in us continues to rage. We have reared more than 350 butterflies at home and continue to enjoy the life cycles of the butter that flies. ■

Shakti and Amarjeetsingh Bishnoi
Balasore, Odisha

The Pristine Chambal

Dammed, polluted, and a trickle, that's the state of many Indian rivers. So when I got a chance to experience a river that was none of the above, I readily agreed. A six hour drive from Delhi airport, towards Agra and beyond, took us to the Chambal Safari Lodge, a lovely property half an hour away from Chambal. A field camp of the local zamindar, in existence since 1890, has evolved into a refurbished safari lodge that is colonial on the outside but modern and cosy inside. A cup of *masala chai* soothed our nerves, jangled by the constant din of vehicle horns and bad roads after Agra. We spent an hour in the evening watching some local birdlife, including the Indian Thick-knee (Stone Curlew), a lifer for me. Sunset was followed by a warm campfire, and a sumptuous dinner.

The next day dawned bright and clear, and guess who we ran into at breakfast: Romulus Whitaker, India's original snakeman (and crocodile man)! I knew him and my late uncle had been his good friend and supporter from the 1960s. A true Indian hero if ever there was one, and a recipient of the Padma Shri, he was there with a BBC film crew to shoot a documentary on the Gharial. He had been responsible for the gharial reintroduction programme in the 1970s: their numbers in the wild have soared from a few hundreds then to a few thousands now. The Chambal, one of the few undammed free-flowing rivers in India, is one of the last remaining refuges of the Gharial, an exclusively fish-eating crocodilian, which requires clean water and large sand banks to breed.

We headed off to the river along with Rom and his team. The river and the surrounding ravines for a couple of kilometres have been incorporated into the National Chambal Sanctuary that stretches across more than 400 km, and forms the border between Uttar Pradesh and Madhya Pradesh. The Gharials were there in good numbers, basking in the sunshine; a couple of huge snout-nosed males allowed us to get close enough for some stunning shots. There were also numerous Marsh Crocodiles that allowed us to get within 'handshaking distance', unlike the Gharial which is more skittish. Bird life was fabulous, with a close shot of the Great Thick-knee, although we missed out on the Indian Skimmer, which is a signature species of the Chambal. Breathing clean air and being on a clean river in the Indian plains (that's actually true) was an uplifting experience!

The afternoon was spent with more birding in the surrounding fields, and watching herds of Blackbuck and Nilgai. We were after the Indian Courser but had to content ourselves with a variety of prinias and a pair of Spotted Owlets from up close. An evening campfire with a sundowner, listening to Romulus rattle off his rattlesnake bite story in Arizona from his US army days, was almost as memorable as being on the river. The next day we headed back to Delhi and work, but not before some relaxed morning birding, which included the Black-breasted Weaver, another lifer for me.

That was one of the best days of my life ! ■

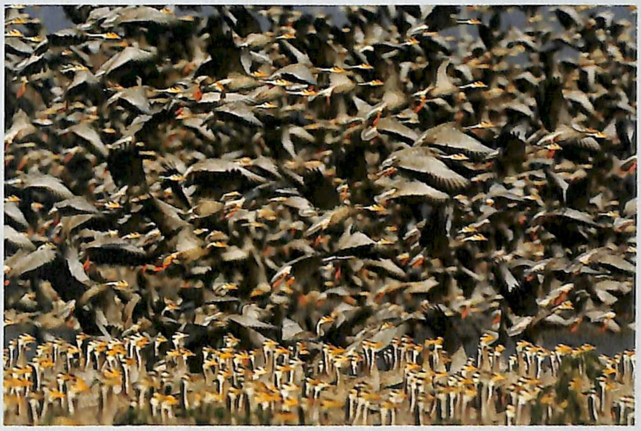
Ram Gopalakrishnan
Chennai, Tamil Nadu

ABOUT THE POSTER

The Bar-headed Goose has fascinated ornithologists for decades because of its remarkable migration. It breeds in high altitude lakes in Central Asia, mainly Mongolia and China, and there is a breeding population in India (Ladakh). In the Indian subcontinent, it winters in Pakistan, northern India east to Bangladesh, and south to Tamil Nadu.

During summer migration, they make an epic flight from the plains of India, up over the treacherous Himalaya, to the breeding grounds in the north. A combination of powerful flapping flight that helps generate body heat (retained by their down feathers), large lungs, an efficient supply of oxygen to the muscles and heart, denser capillaries, and haemoglobin that carries more oxygen, all help them undertake this arduous journey.

BNHS has studied the movements and migration pattern of 45 Bar-headed Goose through satellite tracking studies: 10 birds from Pong Dam (Himachal Pradesh), 25 from Chilika Lake (Odisha), and 10 from Koonthankulam (Tamil Nadu). For details, see the BNHS publication INDIAN BIRD MIGRATION ATLAS.


ARUN SK

Bar-headed Goose *Anser indicus*

This image was taken at Magadi lake, a Ramsar site in Karnataka, where every year about 5,000 geese reach by mid-November.

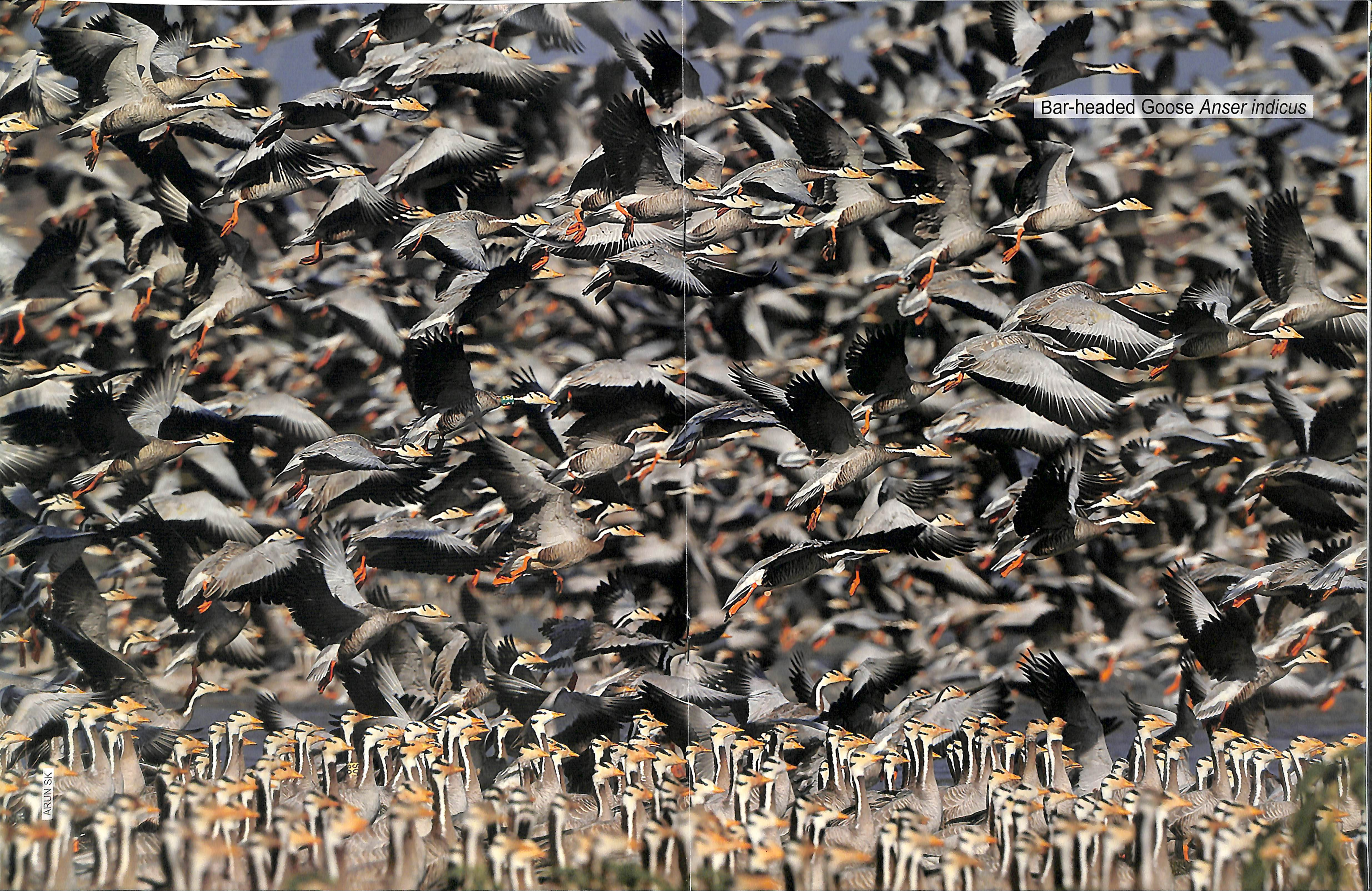
We are grateful to

SETH PURSHOTAMDAS THAKURDAS & DIVALIBA CHARITABLE TRUST

for a generous donation to the

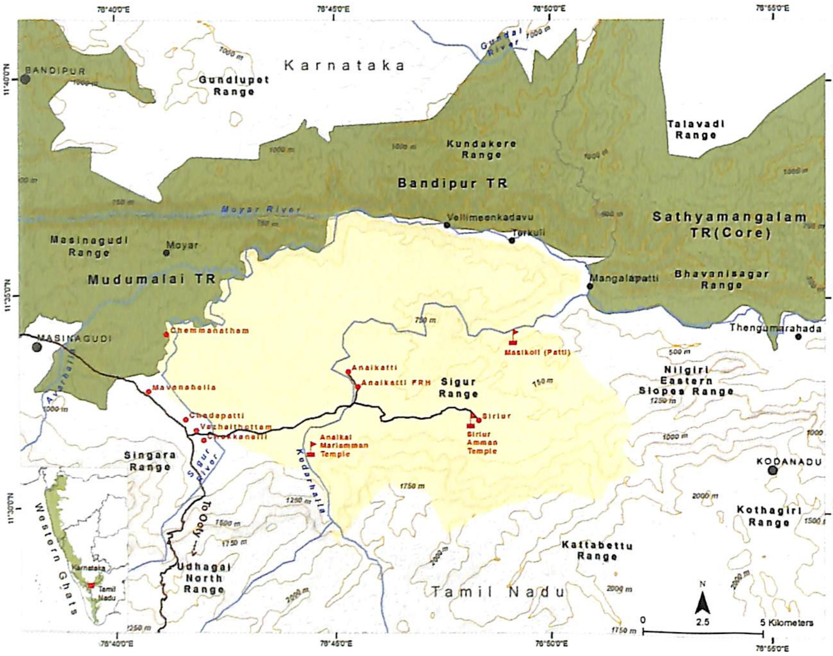
Pratap Saraiya Hornbill Fund

to support the publication of *Hornbill*



Bar-headed Goose *Anser indicus*

ARUN SK


78°40'0"E
78°45'0"E
78°50'0"E
78°55'0"E
11°40'0"N
11°35'0"N
11°30'0"N
Karnataka
BANDIPUR
Gundlupet Range
Gundal River
Kundakere Range
Talavadi Range
Bandipur TR
Moyar River
Vellimeenkadavu
Torkuli
Sathyamangalam TR(Core)
Masinagudi Range
Moyar
Mudumalai TR
Mangalapatti
Bhavanisagar Range
Thengumarahada
MASINAGUDI
Avarhalla
Chemmanatham
Masikoll (Patti)
Anaikatti
Anaikatti FRH
Sigur Range
Nilgiri Eastern Slopes Range
Mavanahalla
Chadepatti
Vazhaithottam
Chokkanalli
Siriur
Siriur Amman Temple
Anaikal Mariamman Temple
Singara Range
Sigur River
Kedarhalla
KODANADU
To Ooty
Western Ghats
Karnataka
Tamil Nadu
Udhagai North Range
Kothagiri Range
Kattabettu Range
Tamil Nadu
N
0
2.5
5 Kilometers
500 m
750 m
1000 m
1250 m
1500 m
1750 m
2000 m

Map constructed by: RAGHUNATH

Sigur Range (marked yellow), October 2017

striped Palm Squirrels briskly running around and noisy Yellow-billed Babblers foraging unmindful of the company of an Oriental Magpie-Robin. House Sparrows found nesting sites in and around the rest house and thronged the area. A Wild Boar was a frequent visitor at night. The forests on either side of the Kedarhalla, which flows about 200–300 m from the rest house, were a favoured haunt of the tiger. The silence of the night was often broken by the alarm calls of Cheetal (more often), Common Langur, and Sambar. Common Indian Nightjar and Indian Scops Owl chimed in to join the nocturnal orchestra in the jungle.

My latest visit was in October 2017, with three PhD students working with NCF. As a result of the recent rains, the entire landscape wore a coat of pleasing emerald green. At the entrance to the Range, we were greeted by the flowering of *Argyreia cuneata*, an erect bushy shrub, which becomes conspicuous because of its shiny purple flowers after the south-west monsoon. The water in the streams which came washing down the red soil of the agriculture fields in the Upper Nilgiris, looked yellowish-red.

Our first day's visit was to Congress Mattam at the north-eastern end of Sigur Range, about 17 km from Anaikatti forest rest house. The road crosses Anaikatti village, the Kedarhalla stream, and then for the first 5 km cuts across the habitat where one can see the ravages caused by overgrazing of cattle in the past. Hundreds of cattle penned in the forest, and the cattle that came from Anaikatti and Siriur villages, were responsible for the habitat degradation. The forest floor was covered with unpalatable species such as *Acanthospermum hispidum*, *Cassia uniflora*, *Cassia occidentale*, *Crotalaria* spp., *Jatropha gossypifolia*, *Leucas aspera*, *Opuntia dillenii*, *Parthenium hysterophorus*, *Sida cordifolia*, *Tephrosia purpurea*, and *Tribulus terrestris*. *Parthenium hysterophorus* and *Ountia dillenii* are exotics; the latter from Central America, with its sharp, long, and brittle thorns, can be a pain to any large mammal using the area.

The Congress Mattam anti-poaching camp, well-protected by an elephant trench, is at the 14th kilometre. Over the years, the camp has improved its facilities significantly, but the major problem is lack of potable water, as the water which comes up from the hand pump is very salty. Rain water is harvested when there is a rare downpour, and drinking water is brought by a vehicle provided by WWF-India. Yet the staff were cheerful. They regularly patrolled the area and often trekked down for more than an hour to the Moyar River which flows deep in the valley, to have a refreshing bath. The climb back to the camp is usually done in the evening and it takes close to two hours. Often their conversation at night is silenced by the *awoong … awoong* call of the tiger, while in response, cheetal and sambar give their frantic alarm calls. During our visit, on the road close to the anti-poaching camp, we saw the fresh pugmarks of a large male tiger and those of a young leopard. Fresh dhole tracks were also seen.

After crossing the area that was ravaged by cattle in the past, amidst the invasives, hundreds of cheetal, close to a thousand in all, were seen. There was an abundance of Painted Thornbush *Dichrostachys cinerea*, some bearing the attractive bicoloured (yellow and pink) flowers. Sadly, the once common sambar were seen only near the Congress Mattam and a total of 35 were counted. One group atop a hill, both males and females, comprised nearly 25 individuals. Sambar has the habit of forming aggregations after the peak rut is over in April-May.

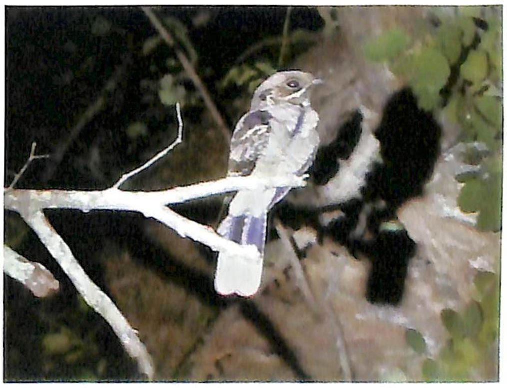
The birds that delighted us on the way were two coveys of Grey Francolin, a bevy of Jungle Bush-Quail, and a Jerdon's Bushchat which was hunting insects and had a brisk dust bath in the middle of the road. Francolins and quails that were seen in the middle of the road may have been basking, and were reluctant to enter the dense ground vegetation on either side of the road. A large Star Tortoise *Geochelone elegans* leisurely walked across the road. Beyond the anti-poaching camp, we saw three female blackbuck running up a slope, and in this behaviour, the blackbuck of Sigur differ from those of other areas where they largely inhabit flat landscapes.

The next day, we visited the Adikombai anti-poaching camp, which is about 5 km from Anaikatti. On the way, there were many Climbing Glory Lily *Gloriosa superba,* with their yellow to orange and scarlet to crimson flowers. This flamboyant species is the state flower of Tamil Nadu. Adikombai camp was not protected by elephant trench all around it because of the rocky substratum at some places. As a result, the staff were not able to grow vegetables in the fairly large compound around the building, as elephants occasionally raided the kitchen garden. Solar-powered electric fences are perhaps the better alternative to trenches in such places. Drinking water is periodically brought in by vehicles. Otherwise the camp is well-furnished with chairs, cots, beds, GPS equipment, and wireless sets, and the support by WWF-India in this regard is appreciable.

With two staff from the camp, Ravikumar from WWF-India, and the students, I walked around the camp looking for animals. A tusker was seen feeding at a distance and our walk disturbed a large group of cheetal which ran away along the slope of a hillock. The most interesting moment of our walk was when we came upon a site in the cool shade of two Ceylon Satinwood *Chloroxylon swietenia* trees, where a small group of elephants had rested the previous day. The floor below the tree was scarred by trampling and was littered with elephant dung and signs of dried urine, and as a result a strong smell of elephants permeated the air. What was interesting was the occurrence of different species of butterflies that had come to mudpuddle on the dung and urine. Individuals of Lemon Pansy *Junonia lemonias* and Blue Pansy *J. orithya* stayed put, enabling me to take pictures.

During our evening drive towards Jagalikadavu anti-poaching camp, in the fading light of dusk, for the first time I noticed Blue Potato Vine *Solanum seaforthianum* plants with their pendulous violet flowers, in three locations. During the two days, we saw several Common Indian Monitor lizards basking

L: Star Tortoise, common in Sigur Range



R: A Nightjar photographed using flash

Scarab beetles, *Onthophagus* sp., Sigur Range, Nilgiri North FD

or hunting amidst the ground vegetation. Where protection is lacking, this lizard is killed for meat, which is alleged to be of medicinal value.

An interesting aspect of Sigur Range history is that it was once part of the Hunting Reserve managed by the Nilgiri Game Association founded in 1877, the first wildlife conservation organization in India. The Association was formed by a group of British planters and big game hunters concerned with the alarming decline of big game. The District Collector was the ex-officio president of the Association and the District Forest Officer was the honorary secretary. Revenue was generated through the sale of game and fishing licenses. The Collector was empowered to issue game licenses and regulate hunting. Females and immature males of deer, Gaur, and Ibex (Nilgiri Tahr) were protected.

While going through the articles related to the Association, one notices four names that stand out prominently: Lt Col. E.G. Phythian-Adams, Major Richard Radcliffe, H.L. Townsend, and E.R.C. Davidar. All four were hunters and anglers, and their love for nature and conservation exudes in their writings. Townsend has recorded that when the first Europeans came up, the 1,800 sq. km Upper Nilgiri Plateau was a natural game sanctuary where the balance of nature had remained virtually undisturbed from time immemorial.

Radcliffe writes that all his hunting was done on his own two feet, with dogs and four or five helpers, in daylight, and done the hard way. He scorned the use of the machan and tied-up bait. He once told me that he shot, in all, 13 tigers, most of them in Sigur Plateau which includes the Mudumalai forests. While shooting the 13th tiger, he tripped and fell on his back, and the wounded tiger sprang onto him and died over his body. Radcliffe gave up tiger shooting after that!

Phythian Adams, while hunting in April 1951, spent two 'blank days' in Mudumalai, before it became part of the sanctuary, as he did not come across a deer with a suitable head. He pens that he had no regret over a blank day, as his chief objective was to view the forest life, and to discover how far the cheetal had recovered from the war years, as these areas had been handed over to a jungle warfare training school. Based on the sightings of cheetal, sambar, and gaur, he concluded that the game had returned in good numbers. He also mentions nilgai and chinkara in the landscape between the Eastern and Western Ghats.

Sigur Range is special to me. Over the years, I have encountered tiger thrice while on foot, and was lucky enough to photograph them twice. The challenge faced by the foresters in managing Sigur Range is the abundance of weeds, as mentioned earlier. Weeds are tenacious, and from the seed stock on the ground, they can keep coming back for several years. So very little can be done about this problem. But by regular uprooting, two species that can be controlled are *Jatropha gossypifolia* and *Opuntia dillenii.* Even these species will resurface repeatedly, but in conservation, the battle against such invasives should continue forever. ■

Acknowledgements: *Thanks are due to Janhavi Rajan, NCF, for reading through the article. Mervin Johnsingh is thanked for editing the pictures*

A.J.T. Johnsingh is associated with WWF-India, Nature Conservation Foundation, and Corbett Foundation. He strives for mahseer, wildlife corridors, and large mammal conservation in the country.

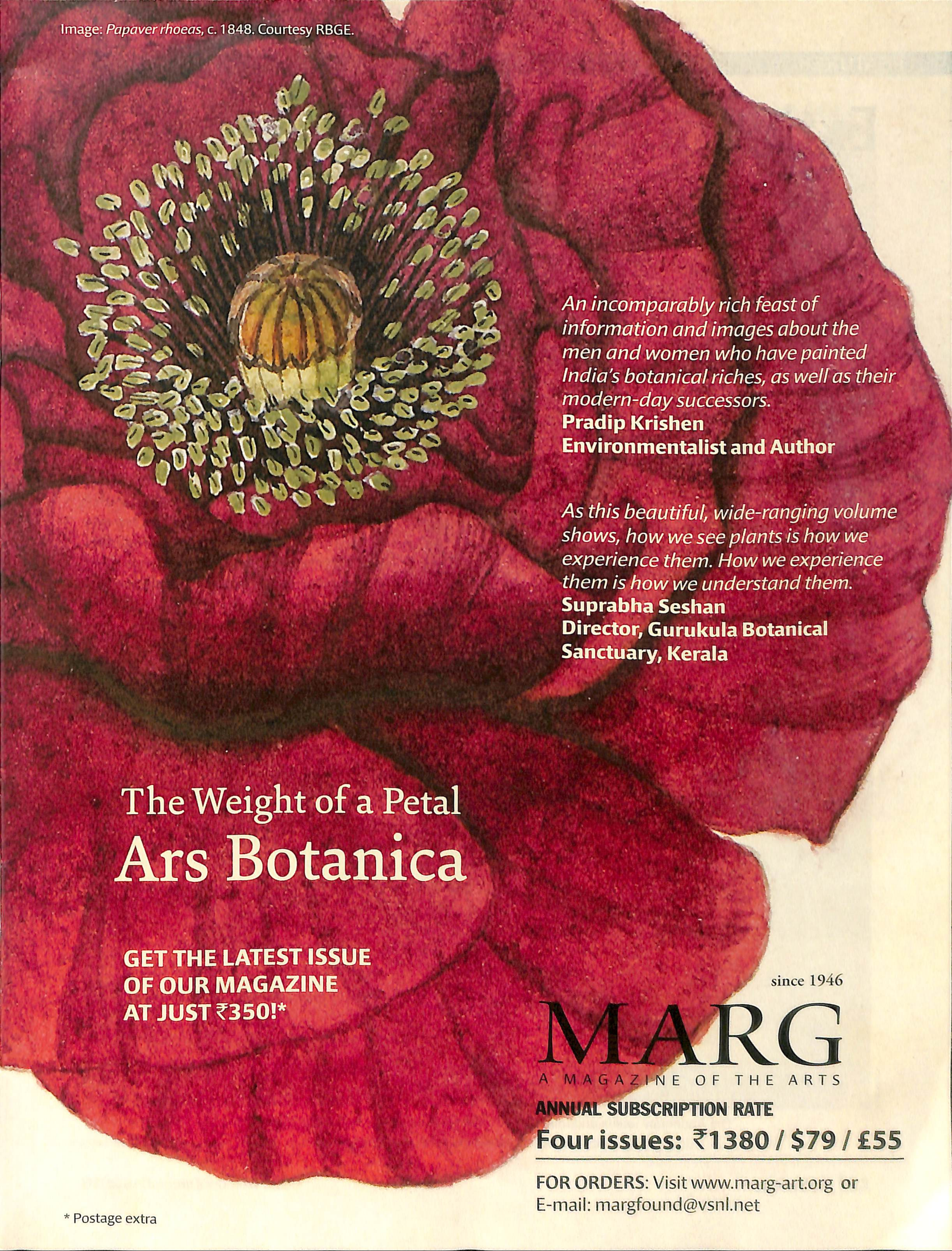


Image: *Papaver rhoeas*, c. 1848. Courtesy RBGE.

An incomparably rich feast of information and images about the men and women who have painted India's botanical riches, as well as their modern-day successors.
Pradip Krishen
Environmentalist and Author

As this beautiful, wide-ranging volume shows, how we see plants is how we experience them. How we experience them is how we understand them.
Suprabha Seshan
Director, Gurukula Botanical Sanctuary, Kerala

The Weight of a Petal
Ars Botanica

GET THE LATEST ISSUE OF OUR MAGAZINE AT JUST ₹350!*

since 1946
MARG
A MAGAZINE OF THE ARTS

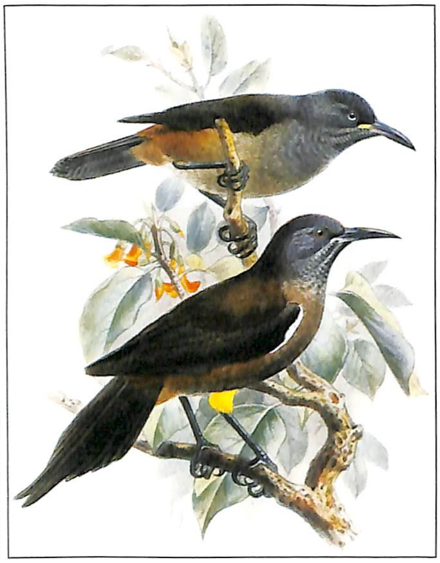
ANNUAL SUBSCRIPTION RATE
Four issues: ₹1380 / $79 / £55

FOR ORDERS: Visit www.marg-art.org or
E-mail: margfound@vsnl.net

* Postage extra

Extinction, courtesy *Homo sapiens*

Text: **Ranjit Manakadan and Asif Khan**

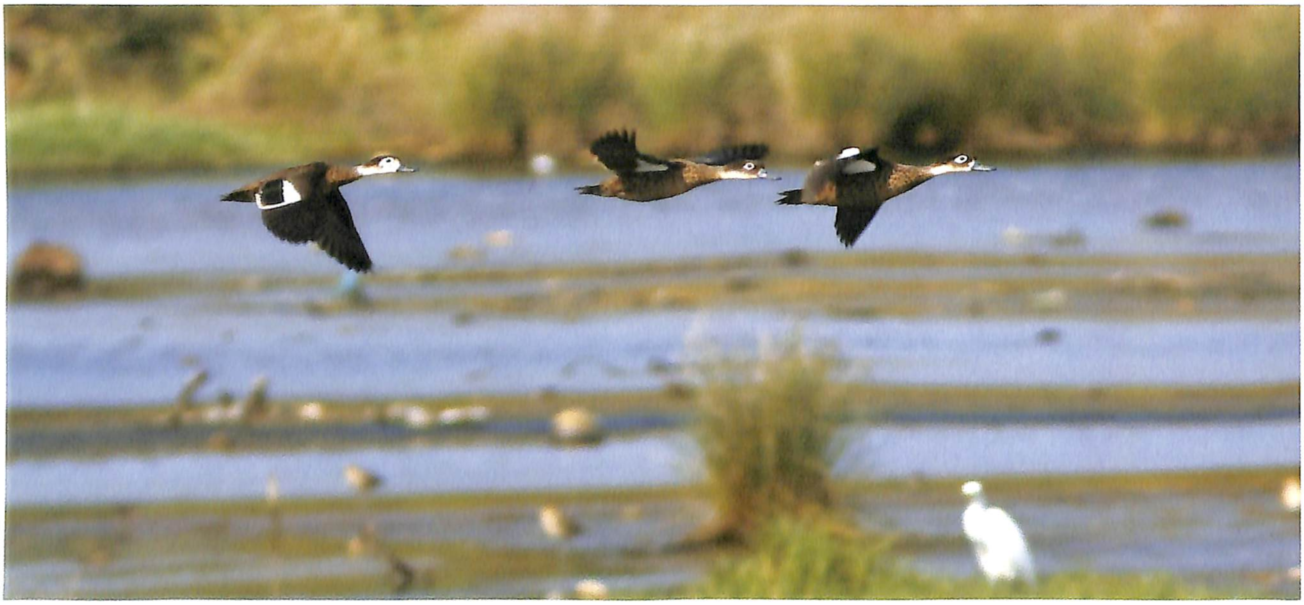


COURTESY WIKIPENDIA

Kaua'i 'ō'ō bird of Hawaii was last recorded singing in 1987

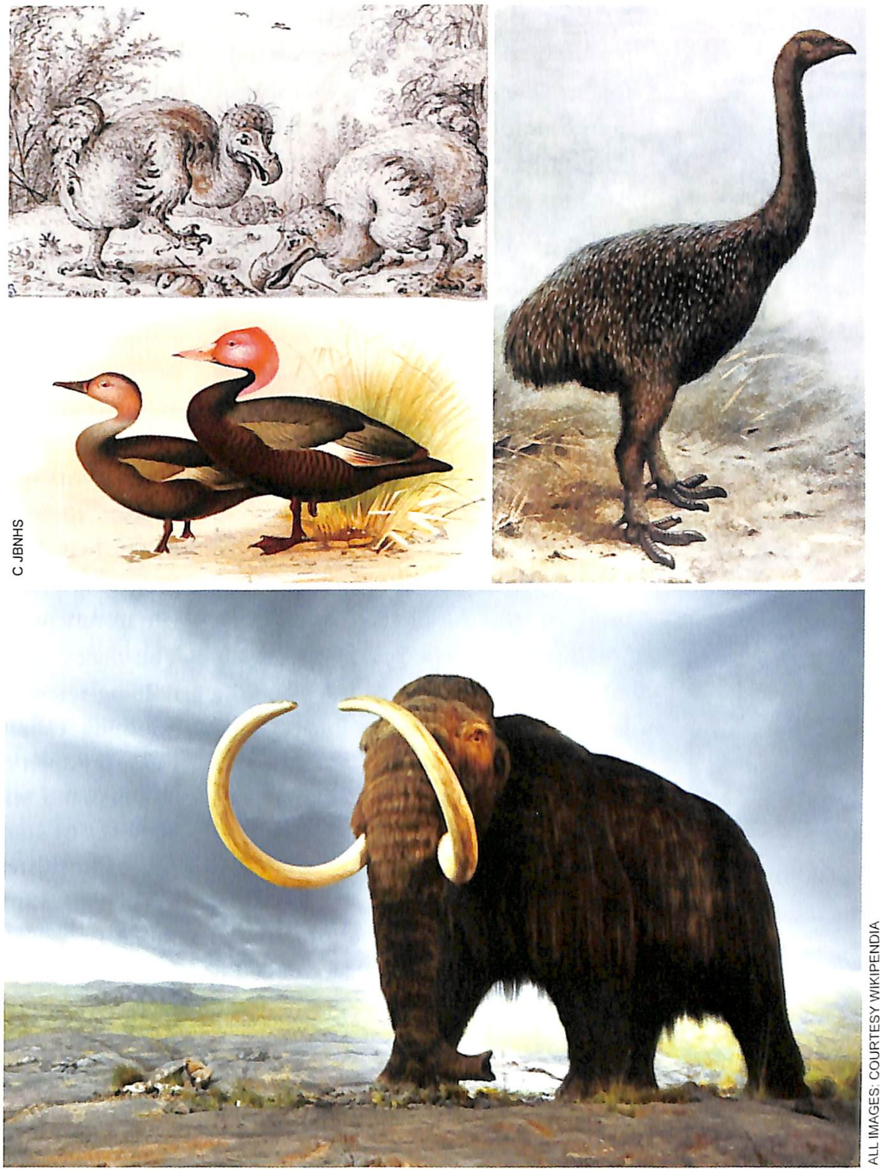
The Kauaʻi ʻōʻō bird of Hawaii is said to mate for life. The male seeks his soulmate by singing, and on pairing, both are known to sing a duet. In 1987, a lone male was heard singing out for his mate, waiting for her to respond – a response that never came. This was the destiny of a species that was once common in the forests of Kauaʻi island. The extinction the Kauaʻi ʻōʻō is not a lone case in Hawaii – Hawaii is infamous for being the "endangered species capital of the world" and "bird extinction capital of the world". Of the 64 endemic bird species of the Hawaiian Islands, about half are now extinct. The isolation of the island group in the middle of the Pacific gave rise to an unusually high proportion of endemic species, evolving sans mammalian and reptilian terrestrial predators. These species, besides other unknown species, got wiped out with the impacts of the arrival of Polynesian (300 and 1120 CE) and European settlers (18th century).

Extinctions tend to be more common in remote, especially small, islands, and those with a high level of endemism. This is because the endemics – a number of them flightless due to lack of terrestrial predators – make easy pickings for food for the settlers. The alien predators that get introduced



ASIF KHAN

The Andaman Teal is endemic to the Andaman Archipelago and Great Coco Island, with a population estimate of less than 1,000 birds (e.g., pigs, livestock, cats and dogs, some of which become free-ranging or feral) or come piggyback with the settlers (e.g., snakes and rats, for which predators like mongoose are introduced later on to control their populations), add to the decimation process. The new diseases that emerge (e.g., avian malaria in the case of birds) to which the native fauna have no resistance, and competition for food resources from introduced/escapee animals, some of which become invasive, constitute additional threats. Along with all these issues, the native fauna faces the onslaught of habitat loss/degradation/modification through forest clearance, wood-cutting, fires, and livestock grazing pressure, among others.



C JBNHS

ALL IMAGES: COURTESY WIKIPENDIA

"Humans regard animals as worthy of protection only when they are on the verge of extinction" – Paul Craig Roberts. SOME LOST SPECIES

Mauritius is another island that is synonymous with wildlife extinctions after the arrival of humans, with the classic case of the Dodo. This flightless species was wiped out by European sailors who started visiting the island in the 16th century, killing the birds for food. Dogs, cats, pigs, rats, and monkeys that got introduced into the island helped to further decimate the birds, which became extinct by 1681. Other than the Dodo, the island has seen the extinction of about 22 documented cases of wildlife, 13 of these being bird species.

The insular continent of Australia is a huge island where the extinctions of its unique fauna have taken place with the arrival of humans, first the aboriginal Australians some 50,000 years ago, and later, the Europeans in the 18th century. The megafauna, comprising 'giant' forms of kangaroos, wombats, monitor lizards, flightless birds, and tortoises, among others, disappeared with time after the arrival and spread of the Aborigines – there are differing opinions on whether climate change, or human impact, or a combination of both, killed off these fauna. And after the European arrivals, 27 mammal species/subspecies, and members of other faunal groups have been lost, the most well-known of which is the Thylacine or Tasmanian Tiger, the largest carnivorous marsupial of recent times.

Other than islands, there have been quite a few cases of human-induced extinctions elsewhere. Mammals lost (species / subspecies) include Barbary Lion, Quagga, and Pyrenean Ibex. Among birds, the often quoted case is the Passenger Pigeon of North America. Numbering in the millions, and traditionally hunted for food by American Indians, this species was senselessly eliminated by European settlers by the 1890s, primarily due to intensive hunting for its meat, aided by widespread deforestation. Some other instances of bird extinction from North America are the Great Auk, Labrador Duck, Carolina Parakeet, and Ivory-billed Woodpecker. The most discussed case of species extinction in India is the Asiatic Cheetah, which is a subspecies of the Cheetah that now only survives in Iran, but had a range from roughly the Arabian Peninsula to Pakistan and India. The Asiatic Cheetah was common in the northern arid tracts of India and south to the Deccan, and was used by the Mughals for coursing antelope. The species had become rare by the early 20th century, and the last records were from Chhattisgarh: three shot dead by the Maharaja of Surguja in 1948, and a sighting in Koriya district in 1951. The Indian Rhino is another species that was wiped out from large parts of its former range over the entire stretch of the Indo-Gangetic Plain, which is now one of the most populated and intensively farmed areas on earth.

CLEMENT FRANCIS

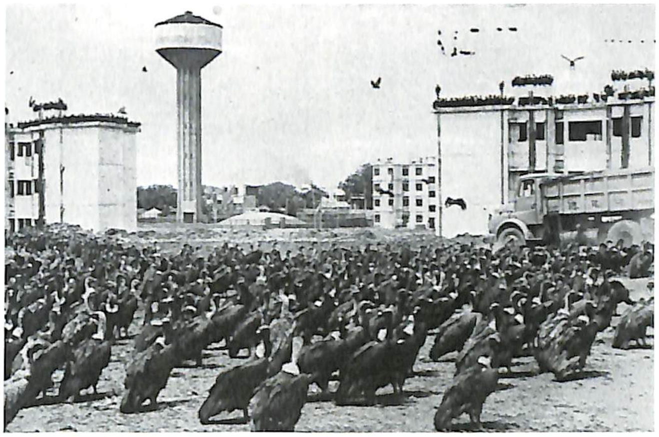
A male Great Indian Bustard, the 'lion' among the grassland birds of India

Among the Indian birds that have not been recorded for many decades and are presumed to be extinct/near extinct are Mountain Quail, Pink-headed Duck, and Green Peafowl. Jerdon's Courser and Forest Owlet, earlier presumed to be extinct, were 'rediscovered' towards the end of the last century, but the present status of the former is again uncertain, with no records for the past few years despite intensive searches. Among the migrants to India is the Siberian Crane, which has stopped wintering in the Indian subcontinent. Until the 1990s, it was the 'star attraction' among the winter migrants at Keoladeo National Park, Bharatpur.

There are also cases of significant population declines of species in the recent past. A species that appears to be on its way to oblivion is Great Indian Bustard (GIB) – unless the conservation breeding programme initiated by the MoEFCC (Ministry of Environment, Forest and Climate Change) is successful. The males are especially large and majestic, and males holding territories make a grandiose display, giving out booming calls that reverberate across the landscape. Being an open grassland species, the GIB (and probably all grassland wildlife species) benefited from the early activities of humans, such as the clearing of forests and rise of subsistence agriculture, aided by low livestock-grazing pressure in the cleared areas. Apart from the threat of predators, occasional hunting for the pot by local trappers was probably the only other danger it faced in early times. (However, there is a reference to the savouries of its flesh in the memoirs of the Mughal emperor Babar, which suggests that it could have been a targeted species.) Things changed with the arrival of the Europeans, guns, and later jeeps, especially for those who considered hunting a sport. One of the most despicable reports of hunting of GIB was in the defunct *Oriental Sporting Magazine*, where a writer signing himself as 'Lover of all Sports' claimed to have killed not less than 961 GIB from 1809 to 1929 in the neighbourhood of Ahmednagar in Maharashtra.

BNHS had carried out a decade-long study on the GIB (along with two resident bustard species, the Lesser Florican and Bengal Florican) in the 1980s. The implementation of BNHS' recommendations to the state forest departments during the course of the project, including the establishment of grassland sanctuaries at a few sites, saw a promising rise in their numbers till the early 1990s. But soon after, a reversal took place, and the current population estimate for the species is about 150 birds, these more or less confined to the desert tracts of Rajasthan. Unforeseen issues like proliferation of power lines and windmills throughout the habitats of the species, ire of locals against the established sanctuaries due to crop depredation by Blackbuck that increased dramatically in numbers, loss of grazing lands, restrictions on right of way and developmental activities in the adjoining areas, 'encroachment' of remote areas by ever expanding cities and towns, and intensification and modernization of agriculture are some of the reasons for the rapid decline of the GIB. Rollapadu Wildlife Sanctuary in Andhra Pradesh, where a 'marching' drove of 24 adult cocks was counted by us in the mid-1980s, is more or less bereft of the species (for which the sanctuary was established), with no male seen since the past few years, and two hens (still around?) laying and sitting on sterile eggs. The Bengal Florican, like the GIB, figures among the Critically Endangered (species facing an extremely high risk of extinction in the wild in the immediate future) category of IUCN's Red List of Threatened Species, while the Lesser Florican comes under the Endangered category. Another dramatic decline among Indian birds is the case of three resident species of *Gyps* vultures. During the BNHS study on bird hazards to aircraft in the 1980s, our biologists used to record thousands of vultures at carcass dumps in north Indian cities. However, the situation is so grim now that birdwatchers get to publish papers on the sighting of a flock of no more than half a dozen birds. The loss of the *Gyps* species of vultures is attributed to the painkiller drug diclofenac used to treat sick cattle. Vultures die with time, on eating carcasses treated with diclofenac.

Diclofenac was duly banned by the Indian Government for veterinary use (and replaced by drugs safe for vultures) in 2006 through advocacy initiatives by BNHS, and conservationists hope that vulture numbers will recuperate, aided further by the conservation breeding programme undertaken by BNHS and RSPB at four centres in India. This programme has been extremely successful in terms of breeding – probably the most successful conservation breeding programme in Asia – with a total of 500+ captive-bred vultures now in the four centres. BNHS is set to release the first batch of eight captive-bred vultures by March 2019 into vulture-safe (diclofenac-free) zones, which will be followed with more releases over the years, after monitoring the status of the first released birds. However, diclofenac continues to be used on the sly, there are other drugs that are toxic for vultures in the market, new conservation issues may arise, and well-founded questions arise on the availability of safe areas with optimal food resources for vultures in the future in a developing/developed India with a billion plus human population.


BNHS PHOTO LIBRARY

An 'army' of vultures in a sanitary landfill in Delhi in the 1980s

BNHS PHOTO LIBRARY

Vultures in the BNHS Vulture Conservation Breeding Centre at Pinjore, Haryana

Even common bird species that have benefited from association with humans in towns and cities in India are disappearing, e.g., the House Sparrow. The loss of open spaces in cities and towns, with the increase in human population and urbanization, advent of box-like architecture that does not provide nesting niches for them, concretization of pathways and compounds, the spread of supermarkets and their like where grain comes packed in plastic (thus cutting out food sources once available), and insecticide-laden pests thrown out into the open from homes,

ASIF KHAN

Indian Skimmer populations are on the decline as a result of threats to their riverine habitat

have all rung the death knell for sparrows. Along with the sparrow, our rapidly changing rural and urban landscapes are seeing declines in species of prinias, bulbuls, orioles, mynas, sunbirds, tailorbirds, babblers, and treepies. Only crows, koels, pigeons, and kites seem to be holding on in human habitation areas … but for how long?

Wildlife and their habitats have been facing the brunt of humankind's activities since the Pleistocene epoch (2 million to 11,700 years ago), as they started to disperse and colonize areas almost throughout the planet. Species that were generally the first to be impacted were the megafauna, as one animal yielded a lot of meat with one hunt. The most well-known among mammal extinctions possibly brought about by humans (and aided by the changing climate at the end of the last ice age) was that of the Woolly Mammoth. Among birds, species that were quickly exterminated were the large flightless birds living in islands that were earlier free of human presence, such as the elephant birds of Madagascar and moas of New Zealand.

With the increasing spread and growth in human population and the resulting impacts (including hunting, deforestation, agricultural expansion and intensification, the impacts of the meat industry, growth of cities and towns, burning of fossil fuels, mining, industrialization, destruction of wetlands, overfishing, and poisoning/pollution of air, soil, and water, and human-induced climate change), especially since the past 400 years, the extinction of species was up to 100 times the normal in the 20th century. There are about 500 clear cases of extinction of animal species attributed to humans, and many of the smaller forms must have also been wiped even before being described to science. According to IUCN (International Union for Conservation of Nature and Natural Resources), it is estimated that by the time the world's primary tropical forests are lost (expected by about the middle of the 21st century), over half of the 1.7 million known species of plants and animals would have become extinct.

With regard to birds, according to Birdlife International, a total of 182 bird species are believed to have become extinct since the year 1500. Nineteen species have been lost in the last quarter of the 20th century, and four more are known or presumed to have become extinct since 2000. As of 2018, 1,630 (13%) species of birds are categorized as Threatened at different levels, and another 1,017 species are categorised as Near Threatened. India has 97 species under the Threatened category, a significant increase from 78 species two decades ago. This list adds up to 178 if Near Threatened species are considered. And among the Threatened

ASIF KHAN

Possibly the largest aggregation of the Endangered Greater Adjutant is now seen in the Guwahati garbage dump

species, 17 are Critically Endangered, which includes the Great Indian Bustard, Bengal Florican, the three resident species of *Gyps* vultures, and those that are most probably already extinct.

The "Sixth Extinction" juggernaut is on the roll in India, and is moving at a devastating pace with 'human development'. The Cheetah has been lost, and so too the Mountain Quail and Pink-headed Duck, and probably also the Green Peafowl. Jerdon's Courser is once again up on the Missing Species Poster. The Great Indian Bustard seems to be on its way out – unless a 'miracle' happens for this slow-breeding species that inhabits a human-impacted landscape. The future of the *Gyps* vultures will be put to test with the scheduled releases of captive-bred birds into the wild. And who knows what new threats (manmade or otherwise) will emerge in our country to impact or wipe out other species. India's human population is undoubtedly the 'mother of all problems' for nature conservation in the country. India has only 2.4% of the world's landmass but supports 17.5% of its population, and together with China, it holds about 40% of the world's population, which is around 7.2 billion now! India's population stands at around 1.3 billion, with about 1.5 million births added each month! These statistics by themselves clearly reflect on the likely future scenario of species extinctions in India. Conservationists tend to be myopic in lauding 'successful' conservation stories. One needs to look at the survival prospects of a species with a much longer time frame – into the next century at least – only then will it make conservation sense.

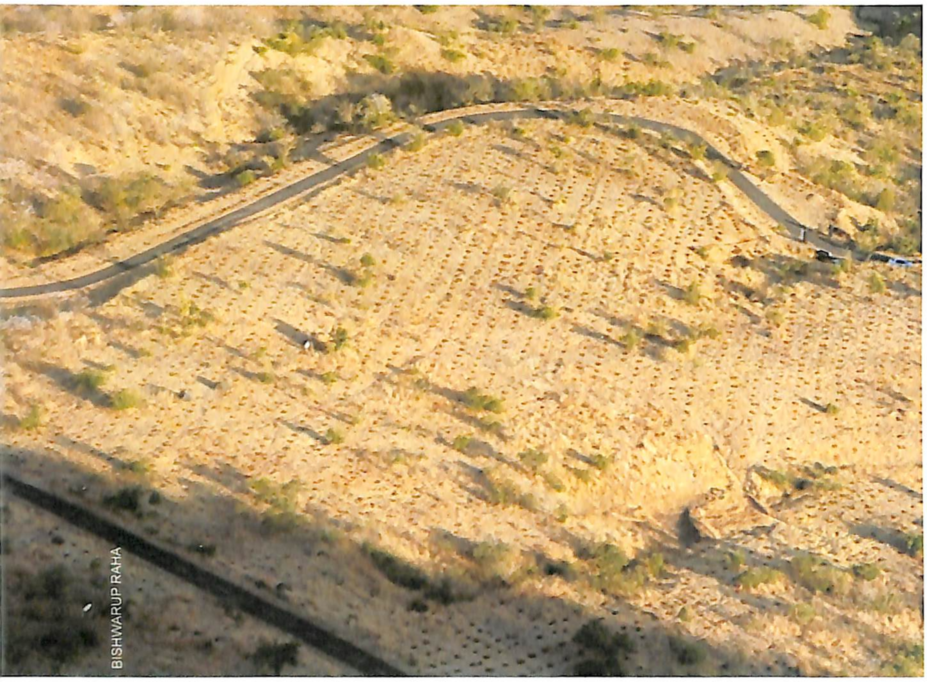
Species (and habitat) extinctions are not new to planet earth, which has witnessed five mass extinction events since the first life forms appeared around 3.8 billion years. The causes for these extinctions were events such as climate change, glaciations, volcanic activity, and the impact of meteorites, and the process was spread over millions of years with new forms of plants and animals taking over. This is quite unlike the extinction process that is going on in this sixth species-extinction event. Never before in the earth's history has the annihilation of so many species occurred in such a short span of time and as a result of one species, the Super Ape that tramples the earth. ■

Ranjit Manakadan is Deputy Director, Ornithology, BNHS. He has experience of grassland birds, waterbirds, forest birds, mammals, and fishes.

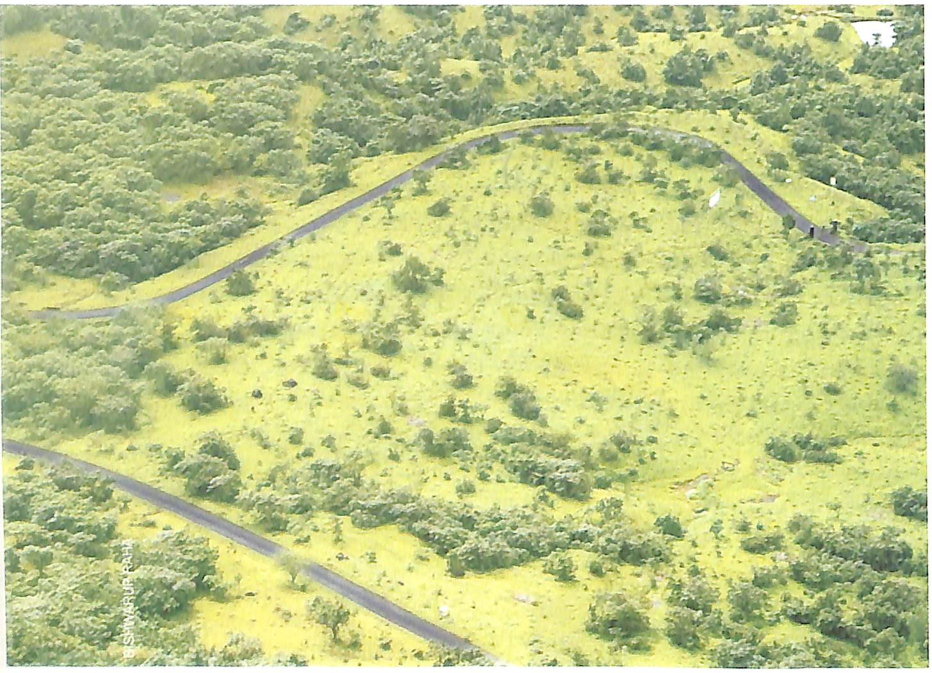
Asif Khan is a traveller, photographer, and an avid birder who works as an Associate Officer (Programmes) at the BNHS

The Borgad Conservation Story

Text: **Pratiksha Kothule**



Borgad landscape before plantation



Borgad landscape after plantation

Lying opposite Ramshej Fort, 17 km east of Nashik city on the Nashik-Peint road, is a group of hills among which the highest, 975 m above sea level, is Borgad (or Bhorkada). These hills lie in the northernmost range of the Western Ghats. A winding road goes all the way up the hills, where there is an Air Force station and hence the area is a restricted area for outsiders. Borgad is among the highest mountains around Nashik (after the Trimbak range), and therefore must have been chosen by the Indian Air Force to locate the station.

Borgad, in East Nashik Forest Division, is within the jurisdiction of the Forest Department. In 2005, Mr Biswarup Raha, a member of the Nature Conservation Society of Nashik (NCSN), along with a few other members, approached the authorities of the Air Force and Forest Department for permission to study the biodiversity of the area. On obtaining requisite permissions, a preliminary survey was carried out, which revealed large tracts of deforestation and a sparse population of birds and animals, in an area that was once known to be covered with a dense forest and harboured a wide variety of flora and fauna. The forest was denuded by overexploitation by the inhabitants of the villages bordering the hill, who cut the trees for firewood and timber. After the preliminary survey, during the initial surveys that were undertaken, the Leopard, Jungle Cat, Striped Hyena, and Indian Peafowl many other forest birds were sighted on a few occasions.

NCSN members then approached the villagers of Tungaldhara, a small hamlet lying in the foothills, to seek their cooperation and help to restore the forest cover and wildlife habitats by planting indigenous trees in the degraded areas. Once their consent was obtained, NCSN requested the Mahindra & Mahindra group to sponsor the restoration and protection of the area with the help of the locals. This India-based multinational provided the funding for tree plantation and also funded the salary of local watchmen for eight years, starting from 2008.

The reafforestation drive, called Project Hariyali (Hindi for greenery), soon got the backing of Mahindra & Mahindra employees, nature activists, school children, Forest Department, villagers, and even the Indian Air Force, in the endeavour. With their joint efforts, the proposed target of planting 1,50,000 trees of native species was achieved within a period of eight years. Nashik district lacks wildlife sanctuaries or protected areas for forest birds – unlike waterbirds which find refuge at Nandur Madhmeshwar. NCSN realized the importance of providing protection to the forest ecosystem to help in the conservation of the resident forest birds, besides the migrants that pass through or winter in the area.

The major emphasis was on saving the existing trees, as this would lead to natural regeneration and benefit the avifauna of area. Along with the afforestation drive, water holes were dug for wildlife to meet their needs during the dry season, and tanks were constructed to supply water to the newly planted saplings. Every sapling was backed with a small earthen pot, which was frequently filled with water during dry spells to ensure that the area around the sapling remained moist.

With time, seeing the good results of the afforestation project, NCSN sent a proposal to the Forest Department for the formation of a Conservation Reserve, the stakeholders being NCSN, the villagers of Tungaldhara, and the State Forest Department. In response to this, Mr. B. Majumdar, then PCCF (Wildlife), visited the area and in 2008, an area of 350 hectares was declared as Borgad Conservation Reserve "for reasons of its ecological, faunal, and floral significance," according to Mr. J.P. Dange, Addnl Chief Secretary. The concept of conservation reserves or community reserves had been incorporated in the Wildlife (Protection) Act, 1972, following its amendment in 2002, and Borgad became the first Conservation Reserve in Maharashtra. This was primarily due to the effort of NCSN, and especially Mr. Raha.

Further positive developments followed. The Forest Department played a crucial role by providing the villagers of Tungaldhara with LPG as an eco-

BISHWARUP RAHA

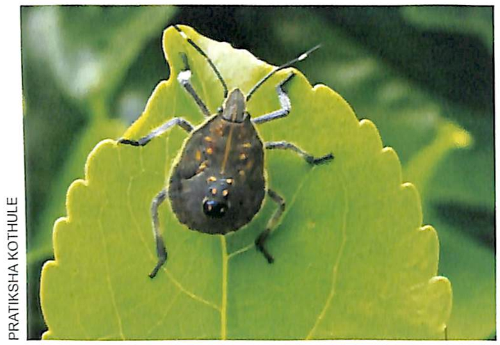
Mr Bhure conducting nature awareness trail

BISHWARUP RAHA

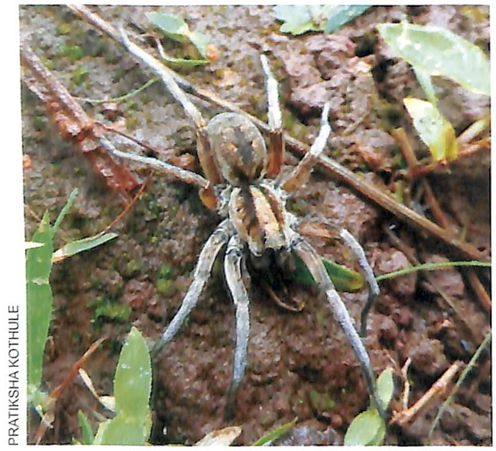
A man-made water hole for wildlife

BISHWARUP RAHA

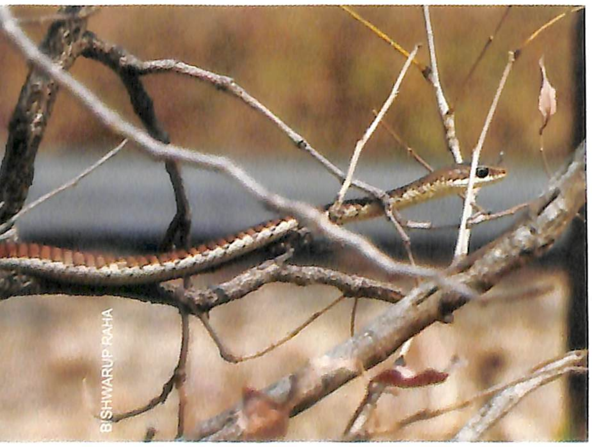
Palash in bloom



Nymph of Shield Bug



Wolf Spider



Bronze-backed Tree Snake

friendly alternative to firewood. Over the years, they have also been provided with smokeless chulhas that work on electricity, and solar water heaters. With all these positive developments, not only have the villagers stopped cutting trees for firewood, but are actively coming forward to participate in the tree plantation activity and guarding the forest. Appointment of local villagers as watchmen was later done by NCSN with financial help from its members, especially Mr. Rahul Gadgil, Mr. Sunil Pophale, Mr. Ashish Kataria, Mr. Vivan Sorab, and Dr. V. Savkar. Check dams and water bunds were constructed to retain rain water. Cutting and hacking of trees and cattle grazing was completely stopped.

With the conservation measures undertaken, there has been a significant increase in bird diversity in Borgad Reserve, with 80 species of forest birds recorded. In 2014, Long-billed Vultures, which used to breed on the cliffs of Borgad around Ramshej Fort, made a reappearance. Two pairs now nest in the area every year. Among other records, around 20 pairs of Indian Blackbird (a breeding migrant to the area) now nest in Borgad, whereas only two or three pairs were present earlier. Franklin's Nightjars are breeding in the area too, with a resident population of 14 birds seen regularly. Other bird species that have colonized the area are Indian Eagle-Owl, Bonelli's Eagle, Eurasian Sparrowhawk, Shikra, Rufous-fronted Prinia, Indian Scimitar-Babbler, Orange-headed Thrush, White-bellied Minivet, and a large number of Jungle and Rock Bush-Quails. Borgad is also visited by migratory birds including Amur Falcon, Montagu's Harrier, Verditer Flycatcher, Blue-headed Rock Thrush, and Red-breasted Flycatcher in winter. Among the warblers are Large-billed Leaf-Warbler, Sykes's Warbler, Orphean Warbler, Tickell's Warbler, and Sulphur-bellied Warbler. Other wildlife includes Common Monitor, Russell's Viper, Palm Civet, Leopard, Black-naped Hare, Indian Porcupine, and Indian Grey Mongoose.

Monsoon flora emerges each year, and during the first week of the season, a million Pink-striped (Crinum) Lilies bloom and brighten up the area. There are three varieties of Karvi S*trobilanthes callosa* that bloom every seven years, and also rare monsoon flora like species of *Ceropegia* that are endemic to Western Ghats. The overall survival rate of the planted trees is around 75%, and they have attained heights equal to the old trees at about 4.5 to 6 m. There are now eight *Ficus* species, and other tree/shrub species include Beheda *Terminalia bellerica*, Shivan *Gmelina arborea*, Ritha *Sapindus mukorossi*, Mahua *Madhuca indica*, Jamun *Syzygium cumini*, Mango *Mangifera indica*, Neem *Azadirachta indica*, Palash *Butea monosperma* species of bamboo, along with the dominant tree species Teak *Tectona grandis*. Today, the green-capped hilltops of Borgad Conservation Reserve speak for themselves.

The small village of Tungaldhara is testimony to the benefits to people from nature conservation. The restored area has not only benefited biodiversity, but is also profiting the locals. The availability of vegetable and fruit species that grow in the forests has increased multifold, such as Kartoli *Momordica dioica*, Chai ki Mor *Dioscorea pentaphylla*, Karvand or Indian Blueberry *Carissa carandas*, wild cucumbers, Amla *Phyllanthus*

BISHWARUP RAHA

Pink-striped Lilies

PRATIKSHA KOTHULE

Young of Dusky Crag-Martin

emblica, and Jamun *Syzygium cumini*. The villagers collect and sell this forest produce and are happy with the additional income.

Earlier, there was only one well in the village which used to run dry by April. In 2018, five wells were dug and a borewell drilled, and the villagers are pleased to find water in all of them. The villagers have now started ploughing their fields, planting wheat, onion, and other crops in summer, otherwise farming was carried out only during the monsoon and winter. All these benefits have come from the tree cover, which reduces evaporation, and maximizes groundwater recharge (with improvement in soil infiltration through the roots and litter inputs, and promoting increased activity of soil organisms).

At present in India, it is hard to find local communities striving to preserve nature in their surroundings. And it is much harder to find villagers, urban folk, and private companies joining hands to work towards this common cause. But all this has happened in Borgad, with the lost glory of Borgad being returned to whom and where it belongs – the lap of Mother Nature. The inspiring example of Borgad Conservation Reserve needs be replicated in other areas/districts which lack protected areas, and would go a long way in protecting wildlife and also promoting conservation with the participation of the locals, NGOs, corporates, and the Forest Department, besides the support of the armed forces. It is essential to have standby funding to ensure that the project continues even after the withdrawal of Mahindra & Mahindra after the promised first eight years of support. ■

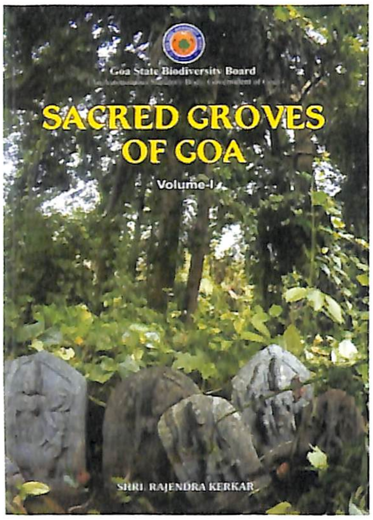
PRATIKSHA KOTHULE

Indian Vulture in flight

Pratiksha Kothule is a wildlife biologist with special interest in birds, mammals, and butterflies. She is currently a Project-Coordinator with Nature Conservation Society of Nashik.

Bishwarup Raha was a renowned naturalist and conservationist based in Nashik. He served as Honorary Wildlife Warden of Nashik, as State Coordinator for the BNHS-IBCN programme for a decade, and was the founder of Nature Conservation Society of Nashik (NCSN). Raha collaborated with BNHS and WII on several projects, including on Great Indian Bustard, Indian Wolf, bird banding, and monitoring of vultures. He played a pivotal role in getting Borgad declared as a Conservation Reserve, and helped initiate the formation of Anjaneri Conservation Reserve for vultures. In 2014, he published his first book BIRDS OF NASHIK DISTRICT – A CONSERVATION GUIDE. Bishwarup Raha was selflessly devoted to the cause of nature conservation. In his passing, BNHS has lost an immensely valuable member.

– **Editors**



Sacred Groves of Goa (Vol. 1)

by Rajendra Kerkar
Goa State Biodiversity Board
Year not mentioned
Size: 21 x 14 cm
Pages: 128
Price: INR 500/-
Paperback

Reviewed by: **Rajdeo Singh**

Shri Rajendra Kerkar is a dedicated environmentalist and member of the National Board for Wildlife. He has written numerous articles and research papers on different aspects of Goa. This book on the sacred groves of Goa is the outcome of intensive field work of several years, with dedicated and repetitive interactions with the local communities of Goa and of the bordering areas of Maharashtra and Karnataka. In this attempt, he has been helped by Raman Kulkarni and the members of Vivekanand Environment Awareness Brigade.

Seventeen of the 36 chapters cover one sacred grove each. These chapters discuss various aspects like sacred trees, sacred groves, sacred water bodies, myths and traditions related to plants, festivals and rituals associated with sacred groves, ecosystem services of sacred groves, and the biodiversity in the sacred groves.

Each sacred grove is discussed in detail with respect to its geographical location, distance from the nearest village, origin of the name of the grove, history, importance, protection, role of the sacred grove in the life of the local villagers, customs, the presiding deity, and the floral and faunal wealth within it. Photographic records of the habitat, deity, important flora and fauna, and customs are provided. A chapter on mining, which focuses on the degradation of sacred groves happening in many areas, talks about the haphazard manner in which mining activities are currently carried out. Annexures and maps are provided at the end of the book.

As for shortcomings, there is a lack of uniformity in write-ups in the sacred grove chapters. For example, some chapters (e.g., chapter 16) have no mention of the flora and fauna of the grove, whereas in others the biodiversity is variously discussed. The chapter on the Ajobachi Tali lists the dominant flora and fauna; a whole paragraph is devoted to the trees occurring in the Devachi Rai of Coparde; butterflies, birds, and mammals are mentioned in the chapter on the Devachi Rai of Surla.

There are a few colour photographs for each grove, but often these are without captions. Chapter 5 gives a unique account on Sacred Water Bodies, but their relation to sacred groves is not made clear.

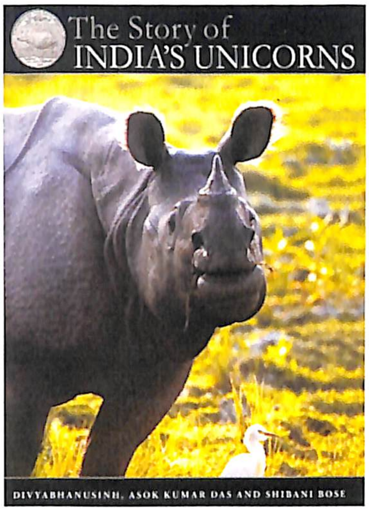
In chapter 7, there are sections on Ashokan and Buddhist edicts, but how these are related to the sacred groves of Goa is not discussed. Chapter 11 on biodiversity discusses cultural practices and is apparently left incomplete at the end of page 43.

There is no species/common names index, while the Contents page is titled "Index". Instead, an Annexure provides lists of common trees, birds, butterflies, snakes and other fauna, and also lists wild plants used in decorating Matoli – a deity, ethnobotanical data related to sacred groves, wild edible fruits found in sacred groves, and host plants of butterflies found in sacred groves. These lists would have been much easier to use had the local or scientific names, been alphabetically arranged; as it stands, one has to scan an entire list to locate a name. Some names from the text are not listed in the Annexure. The lists could have been used to easily compile a conventional index as well.

Photographic documentation of important customs, culture, and festivals related to the sacred groves is an important aspect that is missing in this book. More images of floral and faunal wealth would have enhanced the quality of the book.

Poor editing and proofreading are the main drawbacks of the book. Photographs are without captions; spelling mistakes, especially of scientific names of plants and animals are common; italics have not been used for scientific names. The barcode appears inside the book on page 3, where it does not serve its purpose of providing quick access to the ISBN and list price: it should have been printed on the back cover.

To sum up, despite its shortcomings, this is a useful guide and reference book for laypersons and visitors seeking knowledge on the sacred groves of Goa. ■



The Story of India's Unicorns
by Divyabhanusinh, Asok Kumar Das, and Shibani Bose
The Marg Foundation, 2018
Size: 28 x 21 cm
Pages: 152
Price: INR 2,000/-
Hardback

Reviewed by: **Gayatri W. Ugra**

The Greater One-horned Rhino is the subject of this latest addition to the natural history series from The Marg Foundation, which previously gave us memorable volumes on Asia's lions and Asia's elephants. It brings together the formidable expertise of its authors in the fields of art, culture, history, and natural sciences.

Divyabhanusinh is well-known to BNHS as a dedicated conservationist and historian, with a special interest in large cats, and as a past Vice President of the Society. His first chapter, "India's Unicorns", places the Indian Rhino and its conspecifics in an evolutionary context. The Greater One-horned Rhino, as we know it now, appeared in the mid Pleistocene. It was named *Rhinoceros unicornis* by the father of binomial nomenclature, Carl Linnaeus himself. Known as *gainda* in Hindi, it has even been referred to as *gaur* (not to be confused with Gaur *Bos gaurus*). In Sanskrit, the rhino is called *khadga*, which means sword or scimitar, referring to the horn. All these reflect the physical power of this animal, which has a shoulder height of 175–200 cm and tips the scales at 2,000 kg. The rhino's horn has a maximum recorded length of 61 cm (24 inches) (page 23). Unfortunately for India's Unicorn, it pays with its life for this unique physical feature.

Divyabhanusinh also contributes chapters 6 and 7, "Under the British and Beyond", and "Resurrection of the Unicorn". In chapter 6, accounts of various shikar experiences provide much valuable information on the natural history and interspecific interactions, including conflicts, regarding our unicorn. Abdul Halim Sharar's classic *Lucknow:* THE LAST PHASE OF AN ORIENTAL CULTURE records in some detail that these unicorns were kept in the Nawabs' menageries and made to fight not only among themselves but with tigers, leopards, and elephants. The illustrations in this chapter are particularly interesting.

Chapter 7 "Resurrection…" informs us that in Ayurveda the meat of rhino was recommended, while "the horn had no specific use", whereas in Unani medicine, the horn continues to be used, though in diminishing quantities due to its high price and other factors. The author points out that the demand in India may have reduced, but poaching continues. Other major threats to the rhino population are the annual flooding of Brahmaputra river in Assam, road kills, and the possibility of an epidemic devastating its populations. Divyabhanusinh says "When the population of a species reduces to such an extent that it becomes necessary to count its individuals, it is a warning bell loud and clear for all to hear." The rhino's "horn of despair is a monument to the greed, folly and ignorance of human beings, for it cannot do for them what they believe it can." Yet, he ends on a positive note, "Its resurrection from supposedly less than 200 in 1900 to more than 3,500 in 2015 is impressive. Assam is home to 70% of this population." These numbers speak volumes for the state's commitment to conservation action.

Asok Kumar Das is a senior art historian with a doyen's knowledge of Mughal art in all its forms. His chapter 4 "The Unicorn and the Great Mughals" begins with a gripping account of Zahiruddin Mohammad Babur's first encounter with rhinos "during his entry into Hindustan at a place called Kargkhana or 'rhino-home' in a thickly wooded tract close to the Swat river." The author informs us that this hunt is graphically described in Babur's *Memoirs*, originally written in his mother tongue Chaghatai Turki, and illustrated in three of the four illustrated Farsi (Persian) versions of *Baburnama*, in which the hunt is described in detail. Among the other paintings mentioned in the chapter, particularly interesting are two images, a powerful one from the *Hamzanama* of an unnamed Muslim hero fighting a duel with a gigantic black warrior astride a rhino (page

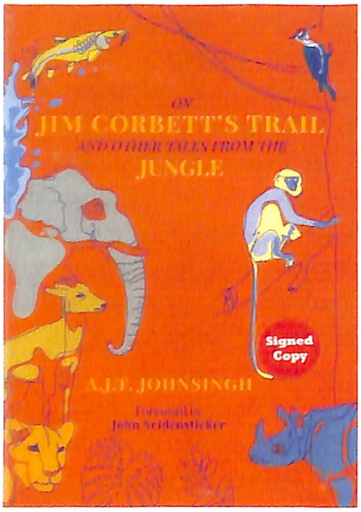
68), juxtaposed against a painting of Majnu in the wilderness, a muted composition with numerous large and small animals, and a pair of rhinos in the foreground (page 69).

Asok Kumar Das's Chapter 5 "At Large in Art and Culture" mentions that the rhino was not associated with any major god or goddess, but cites an exception – a relief at Angkor Wat in Cambodia, where the vedic god Agni is shown riding a chariot drawn by a rhinoceros. The chapter mentions depictions of the rhino in manuscripts, sculpture in stone and terracotta, carpets and textiles, from periods not covered in the rest of the book.

Shibani Bose has contributed chapter 2 "Before the Written Word" and chapter 3 "A Search through Antiquity", bringing to the volume knowledge of the Indian Rhino starting with the fossil record through protohistory, and through the ages to the edicts of Ashoka (268–232 BCE), so "we may reconstruct the story of the animal's journey across millennia before it disappeared from most regions of the Indian Subcontinent". The photograph (page 37) of the shoulder blade of an Indian Rhino from Laghnaj, Gujarat, which has hammer marks (the author calls them pits), indicating its use as an anvil, tells a whole story in itself. So do mesolithic rock paintings, like the one from Jaora, Madhya Pradesh, depicting a man caught between a rhino and a wild boar (page 41).

Chapter 3 tells us what the records of Western travellers say about this unique large mammal. From Quintus Curtius Rufus (100 CE) we learn of Alexander rousing his soldiers for the conquest of the East, where they were told that the region was abundant in timber and rhinos, an item of trade in *The Periplus of the Erythrean Sea* (1st century CE). Aelian's *On the Peculiarities of Animals* mentions a horn brought from India, to which are attributed all kinds of magical properties (p. 59).

Kakubhai Kothari's photographs of rhinos in the wild add much visual interest to the volume. This review provides only a smattering of the vast body of detailed facts about the Greater One-horned Rhinoceros covered by the authors. For their analyses and conclusions, and referenced sources for further exploration, the reader is urged to turn to the book, which at Rs 2,000/- is a bargain. ■



On Jim Corbett's Trail and Other Tales from the Jungle

by A.J.T. Johnsingh
Natraj Publishers, Dehra Dun, 2018
Size: 21.5 x 13.5 cm
Pages: 258
Price: INR 595/-
Paperback

Reviewed by: **Kumaran Sathasivam**

Dr A.J.T. Johnsingh grew up in a small town close to the southern tip of India. When he was a schoolboy, he chanced upon a Tamil translation of Jim Corbett's MAN-EATERS OF KUMAON. He was stirred by Corbett's descriptions of Kumaon, with its forests full of Tiger and Sambar, and its rivers full of the Golden Mahseer. This was the beginning of a great fascination with the author and the land he wrote about. It was not long before the young Johnsingh had read all of Corbett's books.

Johnsingh was also inspired by Corbett to write of his experiences in the wild. He was to have a great many of these experiences in the following years. Beginning as a naturalist, he grew into a professional wildlife biologist. Indeed, he carried out the first scientific research by an Indian biologist on a free-ranging large mammal. In the 1970s, he carried out a doctoral study on the Dhole, or Asian Wild Dog, in Bandipur. Thanks to both his profession, which involved studying and conserving wildlife, and his passion, he has "walked hundreds of kilometres through dense bush and tall grass, ideal resting places for all forms of potentially dangerous animals".

What is it like to go for a walk in a forest with Dr Johnsingh? In the foreword, John Seidensticker draws our attention to Johnsingh's good humour, his joy at walking in the forest and his awareness of all that is going on around him.

Johnsingh's ability to spot wildlife is legendary. As you walk along with him, he points out birds, plants, and animal tracks to you. He quizzes you about what he has told you earlier. In Seidensticker's words, "It comes with deep feeling from a man who really cares about the wildlife and plant diversity that is India. Dr Johnsingh just wants to make it available to you, and to everyone. It is his passion. It is his life-work to really enjoy nature and to make it accessible to all of us. And if you are impressed with his enthusiasm on a walk in the forest, just wait until you are looking for mahseer with him!"

Seidensticker describes walking with Dr Johnsingh as one of the finest experiences you can have in life. Anyone can have this experience now, virtually as it were, thanks to Johnsingh's writings. The present book is a compilation of stories written between 1990 and 2016. The book has two parts, the first one having been published in 2004 as ON JIM CORBETT'S TRAIL AND OTHER TALES FROM TREE-TOPS.

The first part begins with a chapter titled 'Trailing Jim Corbett'. It is set in Kumaon, Corbett country. This is an account of a ten-day trip made by Johnsingh and a colleague to the area between Kaladhungi and Tanakpur. They had both cherished a desire to visit some of the places Corbett had hunted in. Their trip was made some 84 years after Corbett had sat on the branch of a tree, listening to the terrifying sounds of a fight between a tiger and a black bear in a ravine nearby.

By jeep and on foot, Johnsingh visited Mukteshwar, Pati, Dhunaghat, Champawat, Chuka, Thak, and Kaladhungi. These names will strike a chord in Corbett readers. Johnsingh was able to identify numerous spots described by Corbett in his stories: the point where Corbett waited for the Champawat man-eater, the ravine where the tiger and the bear had fought, the confluence of the Ladhiya and the Sharda, where Corbett had found the fishing to be splendid. Johnsingh's narrative takes us back and forth in time, from his own trip to Corbett's adventures and back.

It would all have been very nostalgic, but everywhere that Johnsingh went, he found that the places had changed, thanks to modernization and increase in the human population. Pati, for instance, where 50 people had lived in 1907, had a population of 2,500 when Johnsingh visited it. Where Corbett had once waited to shoot a tiger in the night, there was a road with numerous tea shops on either side. The ravine that Corbett had described was now bare, devoid of vegetation. Bridle paths had been converted to motorable roads on which buses plied. Where there had once been a few grass-thatched huts stood more than a hundred concrete houses. Oak and scrub jungle had been lost to cultivation.

Naturally, and sadly, Johnsingh found little wildlife in places that had had abundant large mammals. He found no evidence of the Black Bear or Sambar. The last tigers had been seen years back. He doubted the reported abundance even of animals such as the Goral and Barking Deer. Johnsingh fished for over two hours at the Ladhiya-Sharda confluence without a single bite. Faced with all these changes, Johnsingh offers constructive suggestions. He recommends that biosphere reserves be created on either side of the River Sharda, in India and in Nepal. He calls for the regulation of fishing in the river and for assiduous protection of the remaining natural vegetation.

In the subsequent chapters of the first part too, the themes are Corbett, wildlife, Kumaon, change, and conservation. One chapter is devoted to the Golden Mahseer, a fish with a future that appears uncertain.

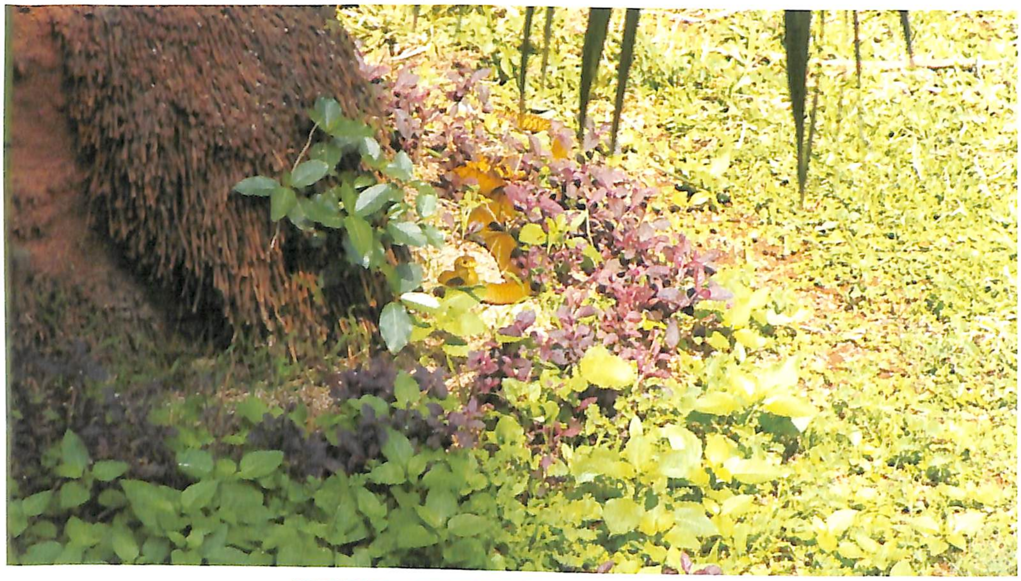
In the second part, Johnsingh writes about visits to locations all across India – Gir, the Mishmi Hills, Kalakkad Mundanthurai Tiger Reserve, Bandhavgarh, Sariska – to Bhutan. Only Kumaon and Corbett are missing from these accounts, but they have all the other ingredients: anecdotes about wild animals, the background of the setting, conservation concerns, recommendations. Naturalists will particularly enjoy 'The Whistling Hunter', based on Johnsingh's experiences with Dhole, the animal he studied for his doctorate.

CORBETT'S TRAIL has a number of illustrations and colour photographs. The layout is pleasing to the eye. This book will be enjoyed by Corbett and mahseer aficionados and armchair travellers. It is for the wildlife enthusiast, whose observations have led him or her, like Dr Johnsingh, to the conclusion 'that we are in the process of losing our valuable and fascinating wildlife in pockets of wildlife habitats'. Dr Johnsingh points out that 'the growing spirit of conservation in the country gives us a flicker of hope, that in spite of increasing problems … the nimble-footed Tahr and Goral, the enigmatic Dhole, the awe-inspiring Tiger, the majestic Elephant and Lion, and the mighty Mahseer may be around to delight our children's children'. ■

An urban nature refuge

Text & Photographs: **Adithi Muralidhar**

There is something pleasant about your work place being located in a green area. Even a few trees and the chirping of birds can lighten up the place and lift your spirits on a dull day. Luckily for me, my work space is located in a small green haven at the edge of Trombay hills and Anushakti Nagar residential colony in Mumbai. The proximity of our campus to such a wooded area allows it to harbour an interesting abundance and variety of wildlife. An area not more than five acres, this green patch



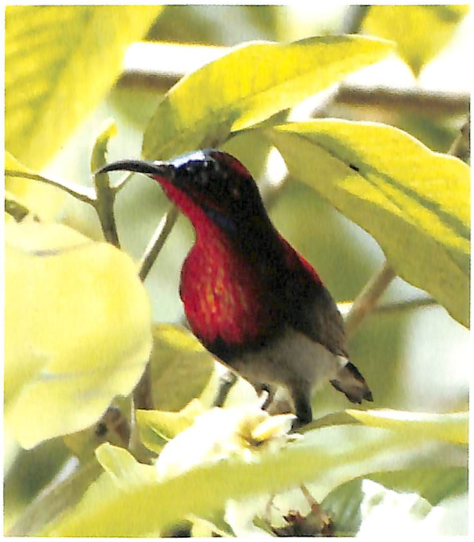
A resident adult Indian Rat Snake on the campus

An Indian Grey Mongoose foraging for food just outside the campus has yielded sightings of more than 50 species of birds, six species of snakes, several amphibians, over 50 species of insects (including butterflies, moths, and beetles), and occasionally mammals. We are always trying to find ways in which we can retain the wilderness in our landscaped gardens.

Other than being delightfully therapeutic, sighting wildlife in your campus has much learning associated with it. Firstly, it indicates that the campus provides suitable microhabitats for living organisms in this predominantly concrete jungle. The campus provides ample nesting spots for birds like Red-whiskered Bulbul, Red-vented Bulbul, Purple-rumped Sunbird, Common Tailorbird, Coppersmith Barbet, and Scaly-breasted Munia. Secondly, it gives us an opportunity to watch wildlife up close. Many wild animals and birds in urban spaces are accustomed to humans and are not much disturbed if left in peace. Additionally, the interaction between different species and their surroundings is of a rather different nature than in typically wilder ecosystems. In fact, we get to see varied and interesting behaviour at close quarters. We have seen Common Myna attacking an Indian Rat Snake; a bat with a young one

Coppersmith Barbet keeping a vigil outside its nesting area

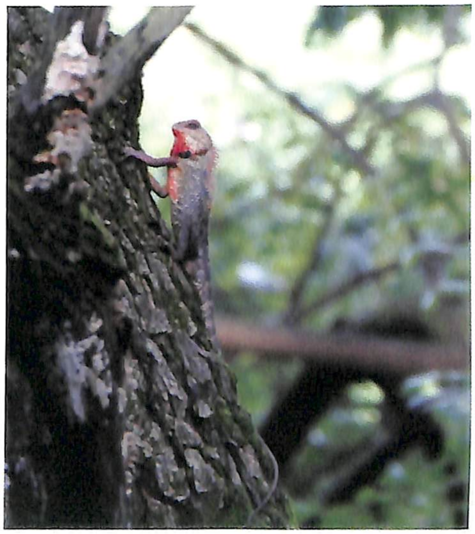
Rose-ringed Parakeet are frequent visitors to the campus



Sahyadri (Vigors's) Sunbird, the most uncommon sunbird on the campus

Beautiful moths occasionally adorn the corridors in broad daylight

The patterns on the Katydid insect are exactly like the venation on a leaf



Garden Lizards move on Rain trees, often displaying territorial behaviour

A juvenile Common Wolf Snake on the campus

Red Pierrot always flutters close to the ground

Scaly-breasted Munia, a resident species

in its belly being attacked by crows and kites during the day; a horde of crows mobbing a mongoose; a Coppersmith Barbet feeding berries to its young; and Scaly-breasted Munias carrying nesting material.

Seasonal patterns observed in flowering and fruiting of trees, nesting seasons of birds, and other such insights into nature help us to achieve a more nuanced understanding of how to manage urban landscapes. For example, the gardening team reported more encounters with snakes with the onset of the monsoon. This (understandably) made them more anxious during their daily routine. We invited an expert on snakes who gave a talk on how to manage our urbanscape, such that it remains a home to snakes and at the same time reduces the chances of unfriendly encounters with them.

At a time like this, when wildlife is getting increasingly constrained in smaller habitats, it becomes imperative on us to make urbanscapes safer for wildlife. If we are looking to live in harmony with wildlife in urban areas, where the density of human beings far exceeds wildlife populations, then we must revisit the ways we design city spaces. Let us work together to foster these last urban refuges. ■

Acknowledgments: *I thank the HBCSE gardening team who help to document the fauna on our campus; Deborah Dutta, Arundhati Dolas and Rupali Shinde who share my enthusiasm for the wild; K. Subramaniam, Sugra Chunawala, Ankush Gupta, Sudhir Pardeshi and Ajay Abhyankar for their constant support; and Kedar Bhide for his insightful talk on "coexistence with snakes", at HBCSE.*

Adithi works at the Homi Bhabha Centre for Science Education, Mumbai, and has an interest in understanding the dynamics of society and environment.

Infinity resorts
Closer to Nature

www.infinityresorts.com

Nature is not a place to visit...
...It's Home

EXPERIENCE
INFINITY
COLLECTION
of WILDLIFE
RESORTS

Corbett

Bandhavgarh

Rann of Kutch

Kanha

Kaziranga

travel operators for tigers

For Reservation: 9650193662/664/665/667

Conservation of Coastal Habitats in Maharashtra – a new approach

Text: **Reshma Pitale**

Tides heave and flow … black-brown rocky outcrops, creeping brown sargassum, lush green *Caulerpa* and *Ulva*, pebbles colonized with aggregations of pinkish calcareous algae, sea anemones peeping through narrow crevices, and many other colourful creatures withstanding the pounding action of sea waves, occupying micro-spaces within a well-organized zonation of the rocky intertidal areas. From relentless summer heat, to high pounding waves of monsoon season and to cool winter waters, the life of inter-tidal creatures is tough, and these very unique complexities make intertidal ecology arouse any researcher's curiosity.

The coastal ecosystem, comprising habitats such as coral reefs, mangroves and seagrass, rocky and sandy shores, is vital not just because it provides ecological services, but also enables fishery and other livelihood opportunities to humans as well as industrial and recreational developments. With rapid expansion of infrastructure, owing to an increasing demand for goods and services, compounded with densely populated coastal towns and cities, the conservation of our coasts will always remain a challenge. Overharvested fish stocks compounded with coastal pollution and loss of habitat have grave consequences for the lives and livelihood of millions of coastal fishermen and other dependent communities.

In India, coral reef, mangrove, and seagrass habitats are relatively well-researched, whereas documentation of the rocky-sandy intertidal areas has been largely ignored, and thus remains unrepresented in conservation discussions. Creatures assembling within the rocky-sandy intertidal areas are distinct since they are adapted to the daily fluctuations

RESHMA PITALE

Kandelia candel is a mangrove species prominently seen along the Vijaydurg creek and Nivati-Bhogave area

RESHMA PITALE

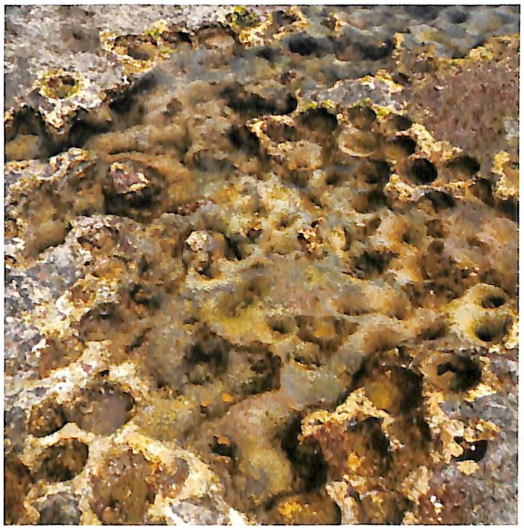
RESHMA PITALE

L: Zooanthus is a close relative of corals and like corals they too have distinct colony architecture

R: *Padina* cf. *tetrastomatica* is a brown alga commonly found along the rocky shore of Maharashtra

RESHMA PITALE

Clithon oualaniense is a commonly found seagrass (*Halophila beccarii*) dwelling gastropod



RESHMA PITALE

A type of microhabitat seen at rocky shores. The rounded cavities are mostly occupied by zooanthus, sea anemones or sea urchins

in the ambient water temperature, salinity, and other key environmental parameters. Their ability to flourish in micro-niches is remarkable, and they can serve as good indicators of the ecological status and health of coastal areas. Though they may not command international significance, it is important to note that these assemblages are regionally and locally important as they play a direct as well as indirect decisive role in the marine ecosystem, in fisheries, and other related sectors of considerable economic value.

Keeping this in mind, in 2010, BNHS initiated surveys on the rocky-sandy patches and mangrove habitats around Ratnagiri and adjacent areas to study their structure and floral-faunal assemblages. The findings of these explorations reveal rich and diverse algal and invertebrate communities thriving in the area. At the same time, these habitats and their fauna face threats from existing and proposed major unplanned coastal developmental activities. A casual glance at the state developmental plans will reveal that developmental infrastructure is planned along almost the entire coast of Maharashtra, and is not restricted to just Ratnagiri and its adjacent areas.

For successful conservation advocacy as well as to provide advisory support to the state government, information was required on the physical and biological characteristics of these areas. Unfortunately, information was available for only a few sites. To fill this lacuna, BNHS undertook a massive exercise to assess the status of coastal and marine biodiversity along the entire coast of Maharashtra, using globally accepted Ecologically or Biologically

Significant Marine Area (EBSA) criteria defined by the Convention on Biological Diversity (see box). These criteria were applied considering their scientific approach, ease of understanding, and uniformity across the world.

Under the study, attempts were made to include almost all the rocky-sandy shores, mudflats and mangrove patches along the creeks, to record the physical structure of the habitat and the associated faunal-floral diversity. Published literature was also referred to for information on known species, to generate a more concise picture. Besides creating the biological and physical baseline database, all the conservation issues along the coastal habitats that could help to draw up a customized process for applying mitigation measures were recorded, as these could be of use in assisting the government to make informed decisions while considering developmental projects in and around these sites.

We identified seven Ecologically Important Marine and Coastal Biodiversity Areas (EIMCBA) of Maharashtra, with the primary objective of getting these assimilated into the Maharashtra State Biodiversity Strategy and Action Plan. Currently, we are engaged in the process of forming EIMCBA pockets by splitting the seven clusters into smaller sections, to enable a realistic balance between conservation management and development.

THE SEVEN EIMCBA CLUSTERS OF COASTAL MAHARASHTRA

Vengurla-Malvan-Achra

This is the southernmost cluster on the Maharashtra coastline and lies in Sindhudurg district. Dense patches of mangroves are present in the three major creeks of this area, namely Achra, Kolamb, and Devbag. Seagrass patches are present along the exposed mudflats of Achra and Kolamb. Ten mangrove species, including Cannonball Mangrove *Xylocarpus granatum*, which has a limited distribution along the west coast of India, are reported from the region. Sundari *Heritiera littoralis* is also located in a small patch. Achra, Tondavali, Bhogve, Kolam, Devbag-Tarkarli, Tank, Vayangani, Kelus, and Nivati are pristine sandy shores.

This cluster includes the largest coral reef in Maharashtra, and sargassum habitat. The cluster includes Vengurla Rocks, an Important Bird Area (IBA), and is the nesting site of about 18,000 Indian Swiftlets,

POOJA NAGALE

The Dighi creek is a rich ground for the Window Pane Oyster, a protected species; immoderate mining can be seen along this creek

RESHMA PITALE

Small scale fishery can be seen along the shoreline. This image was taken along the Malvan shore, Sindhudurg district

RESHMA PITALE

Sand excavation for construction of shore protection barriers destroys the habitat in the high tide region

and marine birds. Records and nesting sites of Olive Ridley (listed as Vulnerable by IUCN) and Green Sea Turtle (Endangered) have been reported from some of the sandy patches. Sightings of mammal species such as Blue, Sperm, and Bryde's Whales, Indo-Pacific Humpback Dolphin, Bottlenose Dolphin, and Finless Porpoise have been reported. Smooth-coated Otter (Vulnerable) are common, and seen in the creeks. Apart from these species of conservation importance or legal protection, others including Black-tipped Shark, various species of rays and skates, seahorses, and more than 350 species of invertebrates, and algae are reported in literature. This cluster, however, has high infrastructure pressures. There are five minor ports, unregulated recreational activities in the reef area, increasing tourism, building of kharland bunds within creeks, and sand mining issues in this cluster.

Convention on Biological Diversity (CBD)

In 1988, the United Nations Environment Programme (UNEP) made a formal initiative to work towards ensuring the sustainable use of biological diversity and its varied components. The final outcome of this process came to be a worldwide legal instrument named Convention on Biological Diversity (CBD) in 1993. Under CBD, subject specialists and legal experts work together to form instruments to execute effective conservation via the sustainable use of biological diversity. The countries associated with CBD, or 'parties' to the Convention, meet every year at the Conference of Parties (COP) for discussions and consultations. The objectives of CBD are:

- The conservation of biological diversity
- The sustainable use of the components of biological diversity
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by (1) appropriate access to genetic resources, (2) appropriate transfer of relevant technologies, and (3) appropriate funding.

Devgad-Vijaydurg-Kasheli

The southernmost part of Ratnagiri district and northern part of Sindhudurg comprise this cluster, which has six major creeks, namely Purnagad, Nate, Ansure, Vijaydurg, Devgad, and Mithmumbri. The cluster has dense old stands of mangroves with 13 mangrove and mangrove-associate species recorded. Seagrass patches are seen along the Nate-Ansure Creek.

Coral reefs in the near-shore waters of Vijaydurg region bear about 21 coral species and dense sargassum forest. The rich biodiversity in the rocky shores and the presence of oyster reefs are key features of

RESHMA PITALE

Terrestrial fringes of mangrove vegetation are turning into garbage dumping places along the Mumbai and Navi Mumbai area

RESHMA PITALE

Recreational activities like driving vehicles on the shore or beach sport activities eventually cause considerable damage to the habitat

this cluster. Patchy reefs are also seen at pristine rocky shores, especially in Kasheli and Ambolgad. Olive Ridley Turtle has been reported nesting at some places. Finless Porpoise, Smooth-coated Otter, Indo-Pacific Humpback Dolphin, and Bottlenose Dolphin are seen along the near-shore area. More than 250 species, including invertebrates and algae, are reported from the area.

The cluster has four minor ports and is an important fishing ground. It also has significant historical and tourism value owing to the Vijaydurg and Devgad forts. An upcoming mega nuclear power plant at Jaitapur is in the vicinity.

Ratnagiri-Jaigad

This cluster comprises major creeks such as Jaigad, Kajitbhati, Shirgao, and Bhatye, with seagrass beds and patches of coral reef. Stands of Cannonball Mangrove occur, especially along Jaigad Creek. Bhatye, Mirya, Tawasal-Padawe, Madban, Kajarbhati-Dhokmale, Malgund, Ganapatipule-Ril, and Vetye are sandy patches where a few records of Olive Ridley Turtle were obtained. The rocky-sandy patches of this cluster are unexplored and highly diverse. More than 200 species, including algae and invertebrates are reported from the area. Indo-Pacific Humpback and Bottlenose Dolphins, and Finless Porpoise are seen along the near-shore areas; Smooth-coated Otter (Vulnerable) is commonly seen along the creeks.

Ratnagiri and Jaigad are minor ports, while open water areas are important fishing grounds. Tourism, khar land (coastal saline soil) bunds within mangrove patches, thermal power plants, rampant sand mining and an upcoming refinery are threats in this cluster.

Guhagar-Dabhol

Dabhol is the only major creek in this cluster, which has narrow, mostly vertical rocky shores. The creek possesses dense patches of mangroves (11 mangrove and mangrove-associate species were recorded by us). Rare sightings were obtained of Indo-Pacific Humpback Dolphin and Bottlenose Dolphin in near-shore areas. Smooth-coated Otter commonly occurs within the creeks. Satellite data shows the presence of a few coral reef patches.

Declining fishing resources in Dabhol Creek and increasing tourism are the main threats. Anjawel power station lies within the cluster.

Velas-Dighi

This cluster comprises the northern part of Ratnagiri district and southern part of Raigad district. Dighi, Bankot, and Anjarle are the major creeks in the cluster. Velas and the adjacent sandy patches are mass-nesting sites for Olive Ridley and Green Sea turtles. Old stands of mangrove vegetation (11 mangrove and mangrove-associate species), seagrass patches in Dighi and Kelshi Creek, and abundant beds of Windowpane Oyster *Placuna placenta*

ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS (EBSAs)

During COP 9 in 2008, seven major criteria were adopted for identifying "ecologically or biologically significant marine areas" (EBSAs) in open-ocean waters and deep-sea habitats. This concept can be used by the countries for marine spatial planning. Further, in COP 10 in 2010, a major decision was taken to ensure that by 2020 at least 17% of terrestrial and 10% of coastal and marine areas should get cover under some sort of conservation measures. CBD acted upon this by organizing nine regional workshops from 2011 to 2014, with 122 countries and 112 organizations (regional/international bodies). The workshops came to the conclusion that about 250 million sq. km (i.e., two-thirds of the world's oceans), could be described in 203 EBSAs over national and international waters. In the same meeting, parties/other governments/competent intergovernmental organizations were encouraged to work collectively to identify and adopt suitable measures in relation to EBSAs. This could include establishment of networks of Marine Protected Areas (MPAs) in accordance with international laws, including the United Nations Convention on the Law of the Sea.

Government of India, being a signatory to CBD in COP 11, approved the proposal on EBSAs as adopted by CBD. However, GoI has not agreed as yet to designate EBSAs within territorial waters. A CBD regional workshop in 2015 provided descriptions for EBSAs in Northwest Indian Ocean and Gulf areas. Wildlife Institute of India (WII) made a comprehensive effort to designate 'Important Coastal and Marine Biodiversity Areas (ICMBA)'. About 350 potential sites from Indian waters were surveyed and scrutinized, of which 106 sites were identified as ICMBAs, which include 52% of the total area of the east coast (44 ICMBAs) and 22% of the total area of the west coast (62 ICMBAs). 22 ICMBAs have been recommended for immediate conservation action. However, GoI has not yet acted on these recommendations.

(a WLPA-protected species) are some key features of the cluster. The rocky patches near Dighi are rich in terms of biodiversity and contain some interesting microhabitats. Patches of coral reef are present in the near-shore waters.

The cluster has four minor ports, and important fishing grounds like Dighi and its surrounding areas. Intensive shell mining, sand mining, three power plants, and one mining-related industry are major threats in this cluster.

Kashid-Akshi

A rocky patch within the sandy shores of Akshi supports a dense patch of Sea Fans (gorgoniids) and a few hydroid species. The sandy shores are also roosting habitats for many tern and gull species, including Black-bellied Tern (Endangered) and Indian Skimmer (Vulnerable). Healthy old stands of Cannonball Mangrove were recorded within Agarkot Creek. The occurrence of Green Sea Turtle is recorded in literature. Tourism and fishing activity were observed along the stretches.

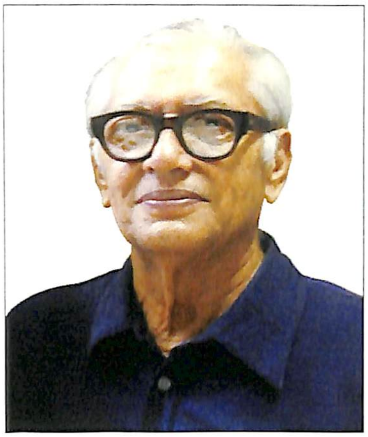
Thane-Palghar

This cluster includes the northernmost coastal districts of the state, and is adjacent to the metropolitan city of Mumbai. Foreshore mudflats within Thane Creek are wintering sites for more than 40,000 flamingos and 150 other bird species, both resident and migrant. Coral patches are seen along the rocky parts near Tarapur. Several industries are present along the margins of Thane Creek. Heavy sedimentation is seen along the rocky patches of the cluster. Dahanu Creek has been destroyed owing to unchecked aquaculture.

The Road Ahead

BNHS is currently developing a Decision Support System (DSS) for these clusters that can be used by government while doing coastal planning and infrastructure development. ■

Reshma Pitale, a scientist at BNHS, works on intertidal biodiversity and conservation, with special emphasis on the Maharashtra coastline.



Boman Framji Chhapgar

January 1, 1931 – August 5, 2018

With the passing on of Dr Boman Framji Chhapgar on August 5, 2018, India lost an illustrious marine biologist and one of her finest carcinologists. His was a life lived to the fullest, on his own terms. He was a unique blend of a nature lover, scuba diver, martial arts expert, and author, who was also a committed blood donor, hiker, and cyclist.

Born on January 1, 1931, in the erstwhile Bombay Presidency, Dr Chhapgar completed his schooling from Bharda New High School and was an alumnus of St Xavier's College, graduating in 1948 with Microbiology as his main subject. Later, he obtained his second B.Sc. degree from the Royal Institute of Science, with Zoology as his principal subject. He registered at the Taraporevala Marine Biological Station, Bombay, for M.Sc. by research, and was awarded the degree in 1954. In 1976, he was conferred a PhD by Bombay University.

Dr Chhapgar joined the Fisheries Department of Bombay State in 1955, and later the Maharashtra State Fisheries Department, and held several posts of responsibility during his tenure: Superintendent of Fisheries, Assistant Director of Fisheries, Curator of Taraporevala Aquarium, and Research Officer, Taraporevala Marine Biological Station. In 1973, he joined Bhabha Atomic Research Centre as Scientific Officer for Aquatic Radioactivity Studies, and finally retired in 1987.

He was elected Life Fellow of the International Oceanographic Foundation, and his portrait is displayed in the Gallery of Carcinologists, National Museum of Natural History, Smithsonian Institution, Washington DC, in acknowledgment of his contribution to the study of crustaceans (he has to his credit the discovery of six new species of marine animals). He participated in the International Indian Ocean Expedition aboard the USS Anton Bruun and INS Kistna (1961–65). In 1983, on her maiden voyage, the Ocean Research Vessel Sagar Kanya had Dr Chhapgar aboard.

He was elected to the Executive Committee of the Bombay Natural History Society for several term (between 1988–1990 and 1992–2004), and served on the Library Subcommittee over many years. He lent his expertise in Marine Biology to the *Journal of the Bombay Natural History Society* as a member of the Board of Editors from 1989 to 2003. A prolific writer, he authored 13 books on life in the sea. Under the pseudonym Beefsea, he penned a series of articles for *Hornbill* magazine. His style was inimitable, as he interspersed marine science with his own experiences, and captivated his readers. He published 52 scientific papers and 37 popular articles in international journals and magazines, some of which were translated into several regional languages. His love of poetry was woven into all he wrote, and his *magnum opus* was his last book, titled UNDERSTANDING THE SEA published by BNHS.

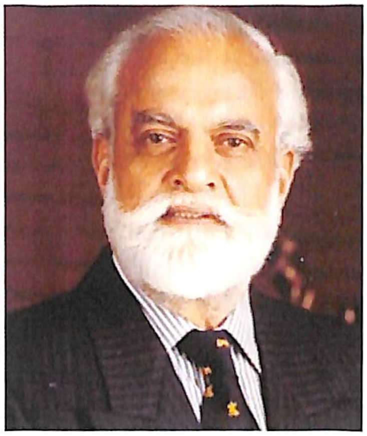
A warm and courteous smile, coupled with conversations sprinkled with wit and humour, were his hallmark. He could enthrall his audience for hours, with his varied experiences and immense knowledge of the sea. No queries went unanswered and he had the ability to communicate with people from all walks of life. He enjoyed interacting with students, teasing them and also leaving them enriched after each encounter. His ability to accept and deal with his visual impairment kept him contented, yet eager to be mentally alert and physically fit. As long as his eyesight permitted, he walked from Cusrow Baug to the BNHS every day. He never liked carrying plastic bags and he solved the problem of carrying documents by putting his newspaper to novel use – he kept his important documents inside the folds of the newspaper, safely tucked under his arm.

Dr Chhapgar's enthusiasm and curiosity were infectious, inspiring many young researchers. As his health deteriorated, and visits to the Parsi General Hospital became more frequent, these faithful young friends would drop by to update him on their work and liven up his room. India's doyen of Marine Biology was also the "perfect patient", to quote his niece Ms Dinaz Vandrewalla, under whose watchful eye and gentle care he spent the last two years of his life. His response to every query regarding his health was a broad smile and a quick rejoinder, "I am fine!" As the news of his demise spread in the scientific community, Dr Rohan Arthur (marine biologist and Scientist-NCF) aptly described him as "one of the true gentle lovers of the ocean in a generation that did not have many ocean champions". Dr Chhapgar inspired several generations of naturalists and he continues to live amidst us through his books.

The Epilogue of UNDERSTANDING THE SEA has a verse by John Dennys which seems appropriate now:

> *"And now we are arrived at the last,*
> *In wish'd harbour where we mean to rest,*
> *And make an end of this our journey past,*
> *Here then in quiet roads I think it best.*
> *We strike our sails and steadfast anchor cast,*
> *For now the Sunne low setteth in the West."* ■

– Smita Krishnan



Vice Admiral Manohar Prahlad Awati

September 7, 1927 – November 3, 2018

Had Vice Admiral Manohar Prahlad Awati started out his professional life as a teacher or as a researcher in the natural sciences, it would have surprised nobody. He was, after all, born to P.R. Awati, a natural science tripos from Cambridge and an entomologist of repute, who would later go on to teach Zoology at the Royal Institute of Science in Mumbai. How Awati came to join the navy instead remains something of a mystery. That he went on to do many interesting things is beyond question!

We don't really know whether or not Awati had any interest in wildlife in his schooldays. However, this much is true: His father, the professor, had an acolyte in the field of Zoology who was destined for fame: Sálim Ali. The latter went on to present a signed early edition of his classic, THE BOOK OF INDIAN BIRDS, to Awati's father. This book came into Awati's possession after his father's passing in 1966. In 1968, he was posted to the Defence Services Staff College at Wellington in the Nilgiris, as the Navy's Chief Instructor. It was around this time that he made the effort to take up ornithology as a serious hobby. In support of this, we find that his copy of Sálim Ali's book on Indian birds quickly found a companion in the same author's later book, INDIAN HILL BIRDS. He had a quick ear for the various bird calls and could imitate a number of them, including the Whistling Schoolboy (Malabar Whistling-thrush) with startling accuracy. His interest was not restricted to birds. In January 1969, we hiked up to the escarpment of the western Nilgiris together with the noted naturalist E.R.C. Davidar in search of the Nilgiri Tahr and their small herds on their even smaller impossible perches.

In the 1971 war, Awati saw action and was decorated with the Vir Chakra. In recognition of his services to the nation, the Government of Maharashtra saw fit to award him 10 acres of land near the village of Vinchurni in Satara district – where he eventually built his home. This was to have a significant impact on his activities during the later period of his retirement. Meanwhile, his naval career flourished and in 1976, at the age of 48, he was promoted to Rear Admiral and took over the post of Commandant of the National Defence Academy, Khadakvasla. It was here that the family relationship with Dr Sálim Ali was rekindled. Sálim Ali remained a frequent guest at the Awati household, right until his passing in 1987.

During his tenure at the National Defence Academy, Awati initiated a survey of the flora and fauna of the 2,000 acre campus. As far as the bird counts were concerned, Dr Sálim Ali played a major role. In parallel, the celebrated botanist, V.D. Vartak (1925–2011) was commissioned to make a comprehensive survey of the flora.

Around 1980, while serving as the Chief of Personnel, Indian Navy, he made an observation that since the Armed Forces spent such a small percentage of time in actually pursuing battle, they were well placed to give a fillip to the cause of afforestation. This could easily be done, he thought, by setting aside some time for officers and soldiers to engage in the planting of trees. Today this is a fairly common practice within most government organizations. At that time though, it was revolutionary enough to find mention in a BBC broadcast.

Retirement from the Navy in March 1983 enabled Admiral Awati to take a more active interest in wildlife and environmental issues while also pursuing, at various times, full time jobs with organizations as diverse as the Tolani Shipping Company and *Blitz*, the newspaper. During the next 20 years, he was a member of numerous birding and wildlife expeditions and stayed in touch with organizations like BNHS and the Ecological Society of India. In 1989, he was appointed Chairman of WWF for Western India, for a two-year period. He was also Vice President of BNHS (1991–1992 and 1996–1998). From 1990 onwards, the area around his house in Vinchurni was regularly used as a venue for wildlife camps for school children, and from 1998 to 2013, a significant area of grassland close to his home was leased out to the Ecological Society, under the stewardship of Prakash Gole, for the purpose of conducting research on grasslands.

Apart from his interest in wildlife, Awati engaged himself in a number of sporting activities: He was a rider and a yachtsman of no mean ability, and almost to the last year of his life, he walked 8–10 km every morning. He was, among other things, the founding president of the Maritime History Society. Awati will be remembered most of all for his almost childlike enthusiasm, spirit of enquiry, his love of adventure, and his uncanny ability to inspire ordinary people to do extraordinary things. ■

– Kedarnath Awati

Harry V. Andrews

December 2, 1956 – November 12, 2018

To those of us who knew him as a friend and colleague, the passing on of Harry Andrews is a loss that is not easy to describe. The few of us who were able to attend his funeral soon realized that the person we could call up at any time, speak to about anything, the person who would cheer us on, was no more.

Harry Andrews passed away on the night of 12th November, 2018, while in Goa with Romaine, his wife, and Tharaq, his son. It was a few weeks before his 62nd birthday, which eventually was celebrated in his memory with a few of his close friends at Romaine's home. Born on 2nd December, 1956, in the Nilgiris amidst tea plantations, Harry Vasanth Andrews was the eldest of three siblings, the son of a senior engineer and a mother whose culinary abilities made their lives so memorable for him to recall. He was schooled at St Joseph's Boys School in Ootacamund, and went on to study engineering in the old city of Madras (now Chennai) in the mid 1970s. While in the jungle or on a boat far away from those hills, given a quiet moment while tending a cooking fire, he would often recollect the days he had lived amidst planters, colonial bungalows, and the pranks and adventures he had there as a child. After a few short stints at work in Chennai, Harry moved on to build his career in conservation after he joined the Madras Crocodile Bank Trust (MCBT) in 1982.

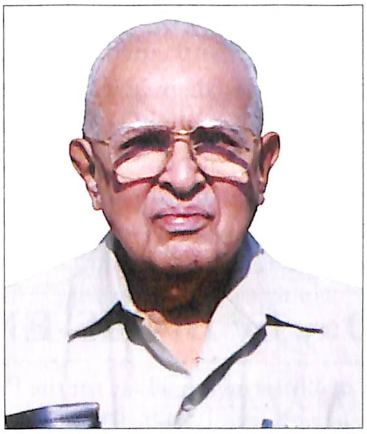
He worked with Rom and Zai Whitaker at the Croc Bank, helping to set up the holding pens, and is remembered by Zai as a quick learner who eventually became an expert in crocodile husbandry and natural history. The core team at the Croc Bank then was small, but dedicated to its various interests, ranging from herpetological science, species and habitat conservation, to the welfare of indigenous people. Harry fit this role well, and came into his own once he was sent over to the Andaman Islands in 1992. He was then Assistant Director at the MCBT and divided his time between Chennai and the Islands. It was after his arrival that further development to establish the fledgling field station of the Andaman Nicobar Environmental Team (ANET) took place.

This process began with field surveys to assess local livelihoods, ecosystems, and species habitats. Harry initiated sailing voyages across the Andaman Archipelago from 1994–2005 to monitor various aspects of the islands' biological diversity, while we also got to understand and learn of the human inhabitants. The small team at ANET sailed out every year, observing and tracking various habitats and the changes that were underway. These trips were originally planned to understand crocodile habitats and sea turtle conservation issues, but broadened to encompass so much else. During this period, he oversaw the construction of many cottages that continue to house researchers at the ANET field station. The engineer in him blossomed yet again while constructing the large wooden office building that today is a central part of the ANET field station. ANET as an institution grew during his tenure to accommodate a larger group of researchers of diverse interests in architecture, conservation science, and sociology to species ecology. Even though he was not trained in ecology or conservation science, he encouraged and accommodated researchers to pursue and broaden their interests, particularly in the conservation of the biological and cultural diversity of the Andaman and Nicobar Archipelago.

Among his best works, beyond his interest in crocodiles and sea turtles, was the 'State of the Environment Report' for the Andaman Islands in 2005. Harry was the key person along with Mr R.S.C. Jayaraj (Andaman & Nicobar Forest Department) and S. Mundoli (MCBT) to have authored this study. There could have been no better person to coordinate this work – the voyages engineered by Harry along with assistance from the Andaman Forest Department, the team was able to coalesce a range of information backed up by "ground-truthing" exercises and fieldwork, to produce a well-researched report on the islands. Harry's field surveys in local dinghies are legendary – having battled stormy weather, two cyclones, and many engine breakdowns during long voyages, he was never shaken and we sailed on to share much conservation related information with relevant government agencies. A large number of contacts he built in this process helped establish anti-poaching protocols, improve A&N Forest Department turtle monitoring camps, as well as coordinate with the Coast Guard and intelligence agencies. At a time when it seemed all was well in the quiet of the islands, our field surveys led by Harry showed us the trends in exploitation of natural resources taking place silently but surely.

From walking through mangrove slush looking for crocodile nests, to attending official meetings in his trademark blue jeans, Harry Andrews had a huge circle of friends from all walks of life. All of us were endeared to him by his persistence in conservation, his calmness, and also his fun-loving nature; to many of us being with Harry meant encouragement, a colourful person with a range of experiences, filled with ideas, broadminded to the extent that he could share in any conversation with both frontline staff and those in officialdom with equal ease. Sea turtle monitoring in the Andaman and Nicobar Islands was initiated and given a big impetus due to Harry's untiring efforts at translating the pioneering work done by Satish Bhasker in documenting nesting beaches across virtually the entire Indian coastline. With officers in the Forest Department who were aware of Harry's commitment, this programme grew to include many more beaches which would offer sea turtles respite from the rampant hunting and exploitation in the islands. Crocodiles, sea turtles, indigenous folk, forests and trees, all were Harry's source of comfort. I recall his pride in telling me how he was growing lavender in a valley of the Nilgiris recently, and I knew he was happy doing the things he loved best. Known for his strong zeal for nature conservation, the way Harry silently championed and coordinated conservation action from the ground up is not easy to match. For those of us who shared and were enthused by his passions, his boat in the ocean sails on through hot sun and heavy squall, to rest in peace. ■

– Manish Chandi



Digveerendrasinh Indravijaysinh Solanki

October 1, 1927 – November 13, 2018

With the passing away of Shri Digveerendrasinh Indravijaysinh Solanki, erstwhile Maharaja of Vansda, on November 13, 2018, at the age of 91, Bombay Natural History Society lost one of its seniormost and committed members. Born on October 1, 1927, Shri Digveerendrasinhji became a member of BNHS on September 17, 1952. He was 22nd in the line of descendents of the Vansda ruling family and ascended the throne in 1947. In 1948, he signed the Instrument of Accession for the merger of Vansda state with the Indian Union.

Once a hunter, like many other ruling princes, Shri Digveerendrasinhji subsequently became a keen naturalist, wildlife photographer, and conservationist. During his hunting days, tigers used to enter Vansda from the Dang forests and Khandesh. Like many other ruling princes, he too owned a private forest of 24 sq. km, which he gave away to the Gujarat Forest Department, and it was due to his efforts that Vansda National Park came into existence in that same forested area in 1979.

Popular as Lalji Maharaj among the people of Vansda, he is remembered for building Pratap High School, Cottage Hospital, and Vansda Palace. An avid painter, his palace walls are adorned with many of his paintings.

During our brief stay in Vansda, he invited the late Dr B.F. Chhapgar and me to watch the release of a leopard caught in a village into Vansda National Park. The environs of his palace harboured Cheetal and Wild Boar, and he maintained a Deer Park in his palace premises. During a BNHS Nature Camp to the Dang forests, he helped to make arrangements and invited the group for lunch to his home. During our return journey, he hosted some local wildlife enthusiasts and the camp participants at his home. As a keen member of BNHS, Shri Digveerendrasinhji once inaugurated a BNHS nature camp at Gir and stayed with the group during the camp.

For many years, he was a member of the Gujarat State Wildlife Board and President of the Valsad branch of WWF. Widely respected in the Forest Department circles of Gujarat state, he was appointed Wildlife Warden of Valsad district, and later of Navsari district. In 2007, he was honoured with a Lifetime Achievement award by the Valsad branch of WWF, which I had the pleasure to attend with his cousin Shri Divyabhanusinh, Mr Ravi Singh (President, WWF-I), and the late Mr J.C. Daniel of BNHS.

Shri Digveerendrasinhji Solanki is survived by his sons Shri Jayvirendrasinhji and Shri Amarendrasinhji. They and their families are also keen nature lovers and follow in the footsteps of the late patriarch. ■

– Ashok S. Kothari

Certificate course by BNHS-ENVIS, MoEF&CC

BNHS PHOTO LIBRARY

Dr S. Balachandran explaining ringing techniques to the course participants

BNHS PHOTO LIBRARY

The participants with Dr Anandi Subramanian, Mr Kumar Rajnish, Dr S. Balachandran, the ENVIS team

The ENVIS cell of BNHS, a Resource Partner of MoEF&CC, organized a 21-day certificate course, starting August 27, 2018, on Bird Migration and Migration Study Techniques, under the Green Skill Development Programme (GSDP), for which 18 participants were chosen.

Apart from classroom sessions, a short field session was conducted at the Coastal and Marine Biodiversity Centre at Airoli, Mumbai and a longer field visit was organized at Point Calimere, Tamil Nadu. The visit to the reservoir of SANMAR Chemplast industrial salt works area, located in the Great Vedaranyam Swamp in Point Calimere, was beneficial for the participants, as more than 100 bird species, including migratory birds, were identified.

The participants also interacted with the staff of the Odisha Forest Department, Chilika Development Authority, and a research scholar from North Orissa University during their stay at Point Calimere. ■

Celebration of International Ozone Day by BNHS-ENVIS

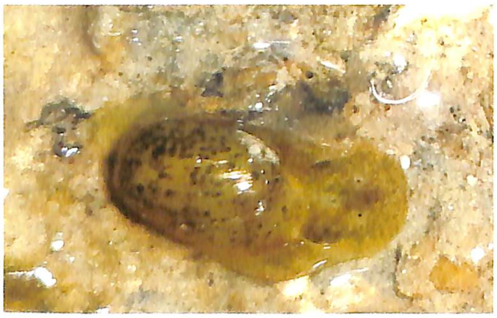
BNHS PHOTO LIBRARY

Students being taught the effect of CFCs on the ozone layer

On the occasion of "International Day for the Preservation of the Ozone Layer", the BNHS-ENVIS team reached out to the public to spread awareness about the ozone layer and its importance. The programme was conducted on September 20, 2018, at Anjuman Khairul Islam Urdu High School, Nalasopara. Students from Classes VII to IX were briefed about the formation of ozone, the effect of CFCs on the stratospheric ozone layer, and the formation of the Antarctic ozone hole. They were also informed about the Montreal Protocol, its achievements, and its theme for this year: 'Keep Cool and Carry On'. The event was appreciated by the students and the school authorities. ■

BNHS researcher describes a new mollusc

A new species of mollusc, *Haminoea aptei* from Andaman and Nicobar Islands, was recently described by Ms Monisha Bharate, BNHS researcher. This slug is found in rocky intertidal shores among cyanobacteria mats and green and red algae. *Haminoea aptei* is also found in the Lakshadweep Islands. The species has been named after Dr Deepak Apte, Director, BNHS, for his brilliant work on the taxonomy of Indian molluscs. ■



BNHS PHOTO LIBRARY

Haminoea aptei from Andaman and Nicobar Is.

Delhi Butterfly Month – 2018

BNHS PHOTO LIBRARY

BNHS has sensitized innumerable individuals through its citizen science programme

The Conservation Education Centre-Delhi, BNHS, with support from the Department of Forests and Wildlife, Government of National Capital Territory (GNCT), Delhi, organized Delhi Butterfly Month 2018, the second such event, in collaboration with Butterfly Research Centre of Bhimtal, Ninox-Owl about Nature and The Delight Factory, Delhi, in September. The aim was to spread awareness about butterflies, gather scientific information to further butterfly conservation, and to initiate expert-public interaction on the subject.

The entire month included various activities like Butterfly Meet, Breakfast with Butterflies, Delhi's Big Butterfly Count, Butterfly Origami, Butterfly Gardening Workshop, Butterfly Walk, Campus Counts, Photography Contest, Painting Competition, Walk like a Caterpillar (Eco Game), and Butterfly Symposium, at various locations in Delhi NCR.

BNHS has sensitized over 3,000 members of the general public and students through its citizen science programme. Participants were educated on insecticide use, changes in gardening practices, and the benefits of planting more native and wild plants instead of exotic or ornamental species.

The butterfly count was held in 51 locations and 75 species were recorded; about 85% of the species seen in Delhi NCR were found in parks. The most common butterflies were Plain Tiger, Common Castor, Common Jay, Danaid Eggfly, and Lemon Emigrant. The rare ones were Indian Red Flash, Bush Brown, Crimson Tip, Red Eye, African Babul Blue, and Common Shot Silverline.

In the upcoming months, CEC-Delhi will be conducting the Golden Jackal Safari, Raptor Survey, and Winter Bird Walk.

For registration please email:
cecbnhsdelhi@bnhs.org or call on 8800741864. ■

BHĀRATĀTIL PAKSHI released at BNHS

The Marathi translation of the popular field guide THE BOOK OF INDIAN BIRDS by Dr Sálim Ali, BHĀRATĀTIL PAKSHI was released at Hornbill House on November 16, 2018, by Shri Vikas Kharage, IAS, Secretary, Revenue and Forests Department (Forests), Maharashtra State, Government of Maharashtra. The translation was accomplished by Dr Arun Joshi, a renowned teacher and guide, who has taken great pains to adhere strictly to the original text, which is a masterpiece and enduring classic among Indian bird books. Known Marathi bird names have been used, and suitable new ones coined where there were none.

THE BOOK OF INDIAN BIRDS was first published in 1941 and has been in uninterrupted publication since then, being revised and reprinted (currently in its 13th edition), with over a million copies sold till date, making it one of the most extensively used field guides on Indian birds. BHĀRATĀTIL PAKSHI will serve to educate audiences seeking information on birds in Marathi. ■

Dr Deepak Apte
पुस्तक प्रकाशन सोहळा
BNHS india
सालिम अली
लिखित
भारतातील पक्षी
अनुवादक: डॉ. अरूण जोशी
श्री. विकास खारगे, भा.प्र.से.
सचिव, महसूल व वनविभाग (वने), महाराष्ट्र राज्य
यांच्या हस्ते
१६ नोव्हेंबर २०१८, वेळ: सायं. ६:३० वाजता
बॉम्बे नॅचरल हिस्ट्री सोसायटी, हॉर्नबिल हाऊस, शहीद भगतसिंग मार्ग, मुंबई ४०० ००१.
भारतातील पक्षी

BNHS PHOTO LIBRARY

(L-R) Dr Deepak Apte, Director, BNHS and Shri Vikas Kharage, IAS, at the release of the book

Published on December 18, 2018, by Mr. Debi Goenka for Bombay Natural History Society, Hornbill House,
Dr. Sálim Ali Chowk, Shaheed Bhagat Singh Road, Mumbai 400 001, Maharashtra, India.

INTERNATIONAL CONFERENCE ON

Wetlands and Migratory Waterbirds of the Asian Flyways

Date: November 18–22, 2019
Venue: Fariyas Resort, Lonavala, Maharashtra

THE CONFERENCE

This conference on wetlands, migratory waterbirds, and flyways of Asia is being organized by the Bombay Natural History Society (BNHS India).

The 5-day conference is intended to provide a common meeting ground for scientists, conservationists, managers, and students to share information and assess the current status of the wetlands and migratory waterbirds occurring along the Asian flyways, namely African-Eurasian Flyway (AEF), East Asian-Australasian Flyway (EAAF), and especially the Central Asian Flyway. It aims to arrive at conservation initiatives that could be taken up for addressing the problems facing wetlands and migratory waterbirds, and exploring sustainable ways to address existing and future problems that arise due to the increasing dependence of humans on wetlands and the earth's other natural resources.

The conference will comprise keynote addresses, organized symposia, panel discussions, besides a field trip to a wetland and a bird banding programme, among others. Accepted papers from the proceedings will be published in a special issue of the *Journal of the Bombay Natural History Society*. The conference is being conducted under the umbrella of the BNHS Wetlands Programme. This programme aims to update and collate the available information on the major wetlands of India of significance to waterbirds (both resident and migratory).

SCOPE AND THEMATICS OF THE CONFERENCE

The conference primarily seeks to obtain insights into the current situation of wetlands, migratory waterbirds, and conservation issues in the Central Asian Flyway (CAF), the primary flyway for avifauna wintering in the Indian subcontinent. It will also invite sharing of information and experiences on the wetlands and migratory waterbirds of the two flyways that partly overlap the CAF, i.e., the African-Eurasian Flyway (AEF) and East Asian-Australasian Flyway (EAAF). The wetland types that will come under the coverage of these flyways for the conference would comprise high and low altitude inland wetlands (including riverine ecosystems), estuarine, and coastal wetlands that are of significance for migratory waterbirds.

THEMES FOR CONFERENCE

- Wetland Ecosystems and Biodiversity
- Threatened Wetland Species
- Conservation and Restoration of Wetlands
- Impacts of Climate Change on Wetlands and Waterbird Migration
- Environmental and Economic Evaluation of Wetlands
- Education and Outreach Programmes as a Tool in Wetland Conservation
- Bird Migration flyways and Bird hazards
- Role of Formal and Non-Formal Designation of Important Wetland sites, and Site Networks in Conservation of Wetlands

KEYNOTE ADDRESSES

- Asian Flyways Concept
- Migratory Waterbird Conservation in the Central Asian Flyway
- Climate Change, Wetlands and Flyways

PANEL DISCUSSIONS

Panel discussions on selected themes will be conducted for setting up priorities and collaborations for documentation and conservation of wetlands of significance to waterbirds in the three flyway regions, especially pertaining to CAF.

- Asian Waterbird Census (AWC) and its significance in Wetland Conservation
- Pelagic Bird Surveys – Enhancing information on pelagic bird migration and the way forward
- Status and conservation issues of Arctic waders in their breeding and wintering grounds
- Flyway collaborations
- Defence Forces and Wetland Conservation in CAF
- Legislation, governance, and conventions in securing wetland ecosystems

SIDE EVENTS

- Importance of manmade wetlands for migratory waterbirds
- Conservation of coastal mudflats for migratory waterbirds
- Sharing of conservation experiences by waterbird sanctuary managers
- Critically Endangered migratory waterbirds of the Asian flyways
- Group discussion for bird ringers of three flyways
- Colour flag coding for waders of the Central Asian Flyway

PASSING OF RESOLUTIONS

Groundwork for resolutions to be passed for consideration and action, arising from the deliberations of the conference, primarily to serve as a feeder to CMS COP 2020, that will be hosted by Government of India.

INSTITUTIONAL SPONSORSHIP

Platinum : Rs. 5 lakh
(includes 2 free registrations)
Gold : Rs. 3 lakh
Silver : Rs. 2 lakh

CORPORATE SPONSORSHIP

Platinum : Rs. 15 lakh
(includes 4 free registrations)
Gold : Rs. 10 lakh
(includes 2 free registrations)
Silver : Rs. 5 lakh

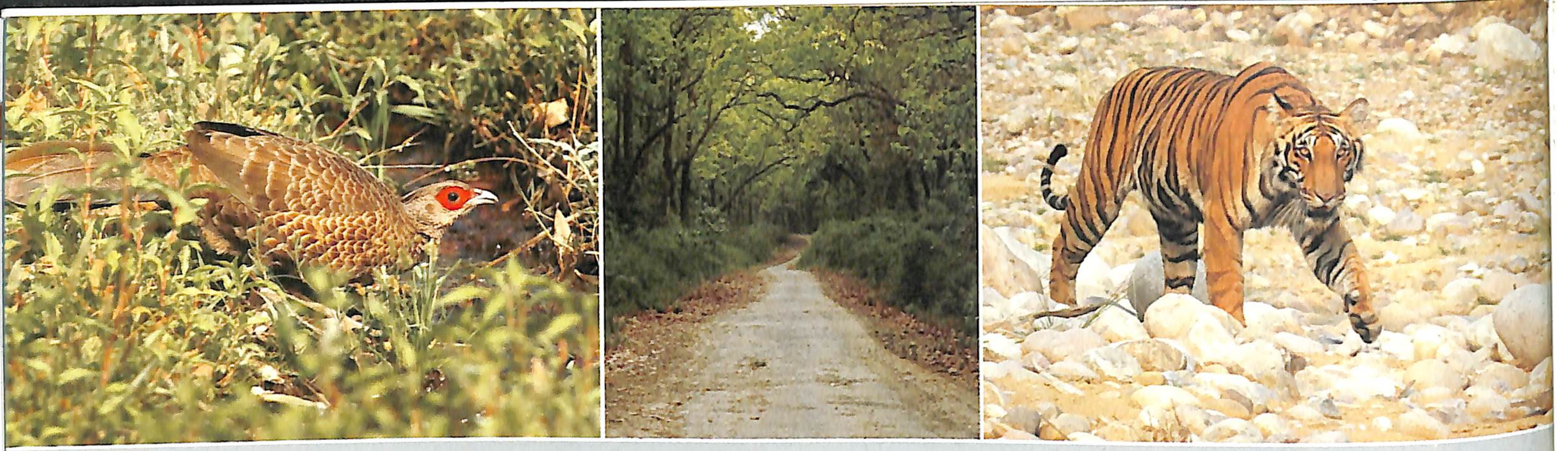
ASSOCIATE SPONSORSHIP

Rs. 25 lakh

We look forward to seeing you at the Conference:

Director
Bombay Natural History Society
Hornbill House, Opposite Lion Gate,
S.B. Singh Road, Mumbai 400 001.
E-mail: director@bnhs.org Conference
E-mail: cwamwaf_info@bnhs.org
Website: https://cwamwaf.in/conference
Phone: (91-22) 22821811 Fax: (91-22) 22837615

BNHS India CONSERVING NATURE SINCE 1883



PROGRAMMES
2019

NATURE TRAILS

January 20	Kanheri Upper Trail
February 17	Flamingo Boat Safari
February 24	Karnala Bird Sanctuary
March 17	Shilonda Trail

INTERNATIONAL CAMPS

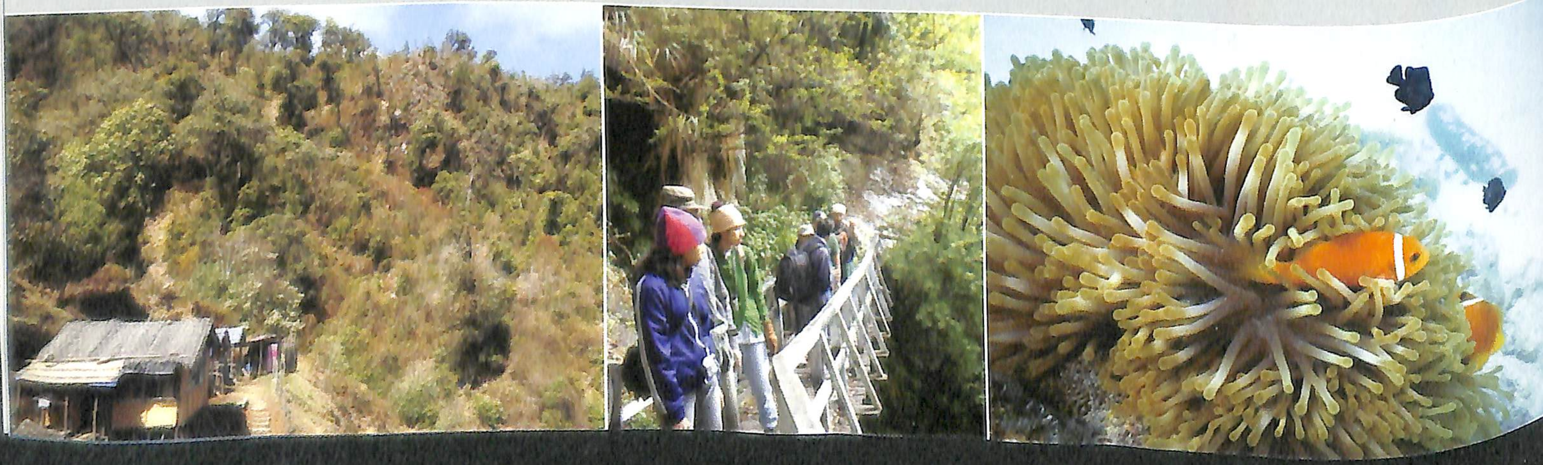
- **March** : Tanzania
  March 3–10, 2019
- **June** : Mongolia
  Date to be announced

NATIONAL CAMPS

- **January** : Golden Triangle
  January 26–31, 2019
- **February** : Marine Camp at Lakshadweep
  February 2–6, 2019
- **March** : Eaglenest Wildlife Sanctuary
  March 21–25, 2019
- **April** : Valleys of Himachal
  April 15–21, 2019
- **May** : Corbett & Pangot
  May 22–26, 2019
- **July** : Valley of Flowers
  Date to be announced

BNHS India
CONSERVING NATURE SINCE 1883

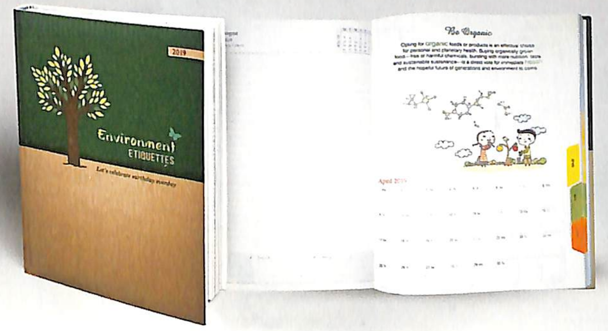
For details: Email us at programmes@bnhs.org
or call on 022-22821811
or visit www.bnhs.org



CONTRIBUTE TOWARDS CONSERVATION OF NATURE

BNHS
EXQUISITE PAINTINGS
A POETIC DEPICTION OF BIRDS
2019
JANUARY 2019

WALL CALENDAR 2019
13 SHEETER SPIRAL BOUND
SIZE 19" x 13.75" | RATE ₹ 160 EACH


Environment ETIQUETTES
Be Organic

DIARIES 2019
BIG SIZE 24.5 cm x 18 cm| RATE ₹ 250 EACH
SMALL SIZE 21 cm x 15.5 cm | RATE ₹ 180 EACH

EXQUISITE PAINTINGS
2019

DESK CALENDAR 2019
13 SHEETER SPIRAL BOUND
SIZE 8" x 7" | RATE ₹ 135 EACH

DESK CALENDAR 2019
13 SHEETER SPIRAL BOUND
SIZE 8.5" x 6" | RATE ₹ 125 EACH

BE A PART OF NATURE CONSERVATION

For any details please contact: Tel.: 022 22025481/82
• Email: cmd@bnhs.org • Website: www.bnhs.org

Registered with Registrar of Newspapers under No. **RN 35749/79**

"FLAMINGO COUNT"

23rd and 24th February 2019

BNHS invites you to participate in its first coordinated flamingo count

BNHS
INDIA CONSERVING NATURE SINCE 1883

For more information

Visit www.bnhs.org | Email flamingocount@bnhs.org